U.S. Department of the Interior

Bureau of Land Management

April 2021

North Alamito Unit 2208 and Betonnie Tsosie Wash Unit 2308 Cluster Oil and Natural Gas Wells Project

Environmental Assessment

DOI-BLM-NM-F010-2021-0003-EA

Applicant: DJR Operating, LLC

Lease Nos. NMNM-117143 and NMNM-050999

Farmington Field Office

6251 College Boulevard, Suite 1A

Farmington, New Mexico 87402

Final EA Cost $12800

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1 Introduction

1.1 Summary of Proposed Action

DJR Operating, LLC (DJR), has submitted Applications for Permit to Drill (APDs) (Form 3160-3 and Standard Form [SF]-299s Application for Transportation and Utility Systems and Facilities on Federal Lands) to the Bureau of Land Management (BLM) Farmington Field Office (FFO) for development of five well pads, each with between three and eight wells per pad, and multiple right-of-way (ROW) grants for the associated off-lease/off-unit access road, well-connect pipelines, temporary use permits (TUP), and lay-flat pipeline, located within 2.75 miles of each other. The five well pads and associated infrastructure are individual projects that are being analyzed in this environmental assessment (EA) as a "cluster project" because of the similarity in geographic area and temporal connectivity and will be referred to collectively as the Proposed Action. The Proposed Action is located within DJR's permitted North Alamito Unit (NAU) (NMNM-135229A) and Betonnie Tsosie Wash Unit (BTWU) (NMNM-135219A). The individual well pads ("proposed project[s]") and their well numbers are listed below.

- NAU I01-2208 Nos. 405H, 406H, 407H, 408H, 509H, 510H, 511H, and 512H (NAU I01)
- NAU E01-2208 Nos. 502H, 504H, 507H, and 508H (NAU E01)
- BTWU G34-2308 Nos. 506H, 507H, 508H, and 509H (BTWU G34)
- BTWU A35-2308 Nos. 213H, 214H, and 501H (BTWU A35)
- BTWU E35-2308 Nos. 502H, 503H, 504H and 505H (BTWU E35)

The BLM FFO is the lead agency for the Proposed Action because it manages the surface estates associated with the proposed projects. Each well would access federally managed minerals permitted by the BLM FFO under approved APDs. If approved, the BLM would also issue ROW grant(s) for the portions of the Proposed Action that are off-lease/off-unit of DJR's active leases, including as associated access road, well-connect pipelines, TUPs, and lay-flat pipeline for the BTWU G34, BTWU A35, and BTWU E35 projects, all located on BLM-managed land. The BLM FFO has received DJR's ROW Grant Applications (Standard Form-299) for the off-lease project components and assigned the following BLM Serial Numbers:

- NMNM-142502, access road
- NMNM-142509, gas pipeline
- NMNM-142509 01, TUP
- NMNM-142520, liquids pipeline
- NMNM-142520 02, lay-flat TUP

The Proposed Action would involve the construction, use, and final abandonment of five well pads and associated access road, well-connect pipelines, TUPs, and lay-flat pipeline as well as drilling, operation, and plugging between three and eight wells per pad for a total of 23 wells. The wells would be horizontally drilled from the proposed pads. The Proposed Action would be located within the boundaries of DJR's NAU and BTWU (except for the off-lease/off-unit actions described above), and would be permitted by the BLM FFO. Additional well, pipeline(s), and TUPs location information is provided in the APDs and SF-299s on file with the BLM. Photographs and maps of the proposed project areas are provided in Appendices D and E, respectively.

1.2 Purpose and Need

The purpose and need for the proposed projects is to allow DJR reasonable access to public land to develop their federally managed mineral lease(s) within the approved NAU and BTWU. The purpose is also to provide DJR access to BLM-managed land while protecting the surface resources to the maximum extent possible.

The need for the Proposed Action is established by the BLM's responsibility under the Mineral Leasing Act of 1920, as amended (30 United States Code [USC] 181 et seq.); 43 Code of Federal Regulations (CFR) 3160 (Onshore Oil and Gas Operations), the Act of March 3, 1909 (1909 Act); and the Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.).

1.3 Decision to Be Made

Based on the information detailed in this EA, the BLM FFO will decide whether to approve the APDs and ROW grants, and if so, under what terms and conditions as delineated in any applicable conditions of approval (COAs). The BLM FFO Authorized Officer will decide to do one of the following: approve the APDs and ROW grants with COAs, as submitted; approve the APDs and ROW grants with additional mitigation measures; or deny approval of the APDs and ROW grants.

1.4 Land Use Conformance

The Proposed Action is in conformance with the September 2003 FFO Resource Management Plan (RMP) with Record of Decision, as updated in December 2003 (BLM 2003a). The Proposed Action conforms to the objectives of the RMP, which states the following:

> It is the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable market prices. At the same time, the BLM strives to ensure that mineral development is carried out in a manner that minimizes environmental damage and provides for the rehabilitation of affected lands. (BLM 2003a:2-2–2-3).

> The objective of the FFO lands program is to facilitate the acquisition, exchange, or disposal of public lands in order to provide the most efficient management of public resources. The program is responsible for processing land withdrawals, granting ROW's and easements on public lands, and acquiring easements on non-public lands where necessary. (BLM 2003b:2-8)

As required by the National Environmental Policy Act (NEPA), this site-specific EA addresses resources and impacts of the Proposed Action that were not specifically addressed within the FFO's Proposed RMP and Final Environmental Impact Statement (PRMP/FEIS) (BLM 2003b). The Proposed Action would not conflict with any local, county, or state plans.

1.5 Relationship to Statutes, Regulations, and Other NEPA Documents

Various federal and state agencies regulate different aspects of oil and gas infrastructure development. Table 1.1 provides a selected listing of relevant permits, regulations, and approvals that could be required for the proposed projects (all tables in this EA are also provided in Appendix F).

Table 1.1. Permits, Regulations, and Approvals Relevant to the Proposed Project

Permit/Regulation/Approval	Issuing Agency	Status
Federal Permit, Approval, or Clearance		
APD	BLM	The applications are currently under review by the BLM and are the subject of this EA.
SF-299 Application for Transportation and Utility Systems and Facilities on Federal Lands	BLM	The ROW applications have been assigned serial numbers by the BLM: NMNM 142502 (access road), NMNM 142509 (gas pipeline); NMNM 142509 01 (TUP); NMNM 142520 (liquids pipeline); NMNM 142520 02 (lay-flat TUP); and are the subject of this EA.
Executive Order 12898	BLM	Section 3.6 describes impacts to minority and low-income populations.
Section 7 of the Endangered Species Act	U.S. Fish and Wildlife Service (USFWS)	The Proposed Action is in conformance with the biological assessment conducted for the RMP (BLM 2002). All fresh water used for pads, road construction, and well drilling and completion will be taken via a temporary lay-flat surface line from DJR's North Alamito Unit Water Source Well No. 7, point of diversion number SJ-4348. No new water depletions are associated with the Proposed Action. No further consultation with the USFWS is required.
Federal Noxious Weed Act (Public Law [PL] 93-629; 7 USC 2801 et seq. 88 Statute [Stat.] 2148)	BLM	Natural resource specialists conducted noxious weed surveys within the proposed project areas in May 2020 (NAU I01 and NAU E01), April 2020 (BTWU A35), and May 2020 (BTWU G34 and BTWU E35). See Table 1.4 for details.
Clean Water Act (CWA) Section 402 General Construction (Stormwater) Permit	U.S. Environmental Protection Agency and New Mexico Environment Department (NMED)	The proposed projects are exempt based on the 1987 Water Quality Act and Section 323 of the Energy Policy Act of 2005.
Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–712)	BLM	The BLM would comply with MBTA pre-construction nesting survey requirements.
Paleontological Resources Preservation Act of 2009 (Sections 6301–6312 of the Omnibus Public Lands Act of 2009, 16 USC 470aaa)	BLM	Table 1.4 describes potential impacts to paleontological resources.
CWA Section 404 Permitting Discharges of Dredge or Fill Material into Waters of the U.S. (including wetlands)	U.S. Army Corps of Engineers	During on-site meetings and natural resources surveys within the proposed project areas, natural resources specialists determined that there would be no impacts to waters of the U.S. Please refer to Table 1.4 for details.
Section 106 of the National Historic Preservation Act	BLM	Table 1.4 describes potential impacts to cultural resources. Any required further consultation with the State Historic Preservation Office would be conducted by the BLM.
State Permit, Approval, or Clearance		
New Mexico Executive Order 00-22 (regarding Noxious Weeds)	New Mexico Department of Agriculture	Natural resources specialists conducted noxious weed surveys within the proposed project areas in July 2018 (NU M35), July 2019 (NU B02), and December 2019 (NU G35 and NU H33). Details are in Table 1.4.
Clean Air Act New Mexico Air Quality Control Act	NMED	Impacts to air quality are described in Sections 3.1 and 3.2. The Proposed Action would be considered a minor source unit and may be permitted with a General Construction Permit per 20.2.72 New Mexico Administrative Code (NMAC). A notice of intent would need to be filed with NMED.

1.6 Scoping and Issues

1.6.1 Internal Scoping

As part of its review of the proposed projects, the BLM FFO Interdisciplinary Team (IDT) conducted internal scoping to identify potentially affected resources and land uses. The IDT meetings were held August 3, 2020 for the E1 and I1 well pads and August 10, 2020 for the G34, A35, and E35 well pads. The IDT Checklist (Appendix G) provides a list of the issues that were considered, along with the rationale for further analysis or dismissal from further analysis in this EA.

1.6.2 External Scoping

The BLM FFO posted the proposed the project on the BLM National NEPA Register ePlanning website (BLM 2020a) . This listing included a description of the Proposed Action and a map of the proposed project areas.

External scoping also included giving interested parties an opportunity to attend the BLM on-site meeting for each of the proposed projects. The on-site meeting for the proposed NAU I01 and NAU E01 projects was held on June 11, 2020, and the on-site meeting for the proposed BTWU G34, BTWU A35, and BTWU E35 projects was held on August 18, 2020. Table 1.2 below is the list of individuals and groups invited. Attendees included staff from the BLM FFO, DJR, Nageezi Chapter House, New Mexico Department of Game and Fish, and SWCA Environmental Consultants (SWCA).

Beginning on March 15th 2021, the FFO and proponent engaged in ethnographic interviews with Navajo Chapters and individuals for the proposed action to gain further input. Following the guidance from the Navajo Nation Heritage and Historic Preservation Department (NNHHPD), the FFO provided direction and aided cultural contractors in their effort to safely conduct ethnographic interviews during the COVID-19 pandemic. Ethnographic interviews were considered completed on April 9th, 2021 and were concluded as portion of the scoping and tribal outreach efforts for this project.

Table 1.2. Individuals and Groups Invited to the On-site Meetings

Name	Group
Bruce Baizeers	Earthworks
Thomas Singer, Erik Schlenker-Goodrich, Kyle Tisdale	Western Environmental Law Center
Mike Eisenfeld	San Juan Citizens Alliance
Samantha Ruscavage-Barz, Jeremy Nichols, Rebecca Sobel	WildEarth Guardians
Anson Wright	Chaco Alliance
Lori Goodman	Diné Care
Don Schrieber	Devil Springs Ranch
Joe Trudeau	Center for Biological Diversity
Miya King-Flaherty	Sierra Club
Tweeti Blancett	Interested Public
Pinu'u Stout	Pueblo of San Felipe
Sonia Grant	University of Chicago/Private Citizen
Daniel Tso	Interested Public
All Pueblo Council of Governors	All Pueblo Council of Governors

Name	Group
Michael Casaus	New Mexico Wilderness Society

1.6.3 Issues Identified for Analysis

Using internal and external scoping in accordance with guidelines set forth in the BLM NEPA Handbook (BLM 2008a), the BLM FFO developed a list of issues to analyze in detail in this EA. The key issues identified during agency scoping are summarized in Table 1.3. The impact indicators provided are used to describe the affected environment for each issue in Chapter 3, to measure change in the issue for different alternatives, and to assess impacts of alternatives.

Table 1.3. Issues Identified for Detailed Analysis

Issue Number	Issue Statement	Impact Indicator
Issue 1	How would emissions generated by equipment associated with the Proposed Action impact air quality?	Emissions
Issue 2	How would the future potential development of the Proposed Action contribute to greenhouse gas (GHG) emissions?	Emissions
Issue 3	How would future drilling and completion operations associated with the Proposed Action impact groundwater quality and quantity?	Water Volumes Number of Wells
Issue 4	How would vehicle traffic and public road safety be impacted along the proposed haul truck route, which includes the communities of Counselor and Nageezi?	Increased Traffic
Issue 5	How would the development of the Proposed Action impact the quality of life of nearby residents, including the communities of Counselor and Nageezi?	Noise, Visual, Air Quality, Traffic, Water Quality
Issue 6	How would the development of the Proposed Action impact environmental justice communities, primarily the communities of Counselor and Nageezi?	Quality of Life, Traffic, Noise, Visual, Water Quantity and Quality, and Air Quality, including GHGs

1.6.4 Issues Identified but Eliminated from Further Analysis

As described in Section 1.6.3, agency scoping was utilized to determine the issues that require detailed analysis in this EA. Table 1.4 below includes a detailed explanation of remaining issues that were discussed but that will not be further analyzed in this EA. A “checklist” summarizing the BLM FFO’s NEPA IDT discussions is included in Appendix G.

Table 1.4. Issues Identified but Eliminated from Detailed Analysis

Issue Statement	Rationale for Not Further Discussing in Detail in the EA
How would proposed ground-disturbing construction, operation, and maintenance activities impact cultural resources?	Impacts to cultural resources from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. There are no Chaco Culture Archaeological Protection Sites or United Nations Educational, Scientific and Cultural Organization World Heritage Sites within or near the proposed project areas. Four Class III Archaeological Surveys (NMCRIS No. 146574; BLM Report No. 2021(I)002F, & NMCRIS No. 146998; BLM Report No. 2021(I)002.1F, NMCRIS No. 145984; BLM Report No.2020(III)014F, NMCRIS No. 145985; BLM Report No. 2020(IV)001F) were conducted in the proposed project areas and during these surveys eight cultural sites (LA178234, LA82880, LA82881, LA197578, LA197579, LA197580, LA197581, & LA197582) were discovered. Two sites (LA82880, & LA178234) were determined to be Eligible for listing on the NRHP, three sites (LA82881, LA197578, & LA197580) were determined to be Not Eligible for listing, and three sites (LA197579, LA197581, & LA197582) were given an Undetermined eligibility status. The sites that were given an Eligible and Undetermined eligibility status will require protective fencing and the presence of an archaeological monitor. With adherence to these stipulations, the proposed project will have no effect to Historic Properties.Details of the cultural resources surveys of the proposed project areas, as well as results of Section 106 consultation and government-to-government consultation, are detailed in Chapter 4. Project design features and best management practices (BMPs) (detailed in Appendix H) would mitigate impacts to cultural resources to the point that detailed analysis is not warranted. The proposed projects would be in compliance with Section 106 of the National Historic Preservation Act (NHPA).
How would proposed ground-disturbing construction, operation, and maintenance activities impact Native American religious concerns or other concerns?	Impacts to traditional cultural properties (TCPs) from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. Results of the cultural resources surveys of the proposed project areas, as well as results of NHPA Section 106 consultation and government-to-government consultation, are provided in Chapter 4. Per the BLM's cultural records of review, there are no known TCPs or sensitive cultural areas present in the proposed project areas (BLM 2021). No project-specific ethnographic study was performed outside of ongoing BLM-led tribal consultation and engagement to address any potential ethnographic concerns. Additionally, DJR conducts an ongoing outreach program with the Navajo Nation Chapter Houses, Nageezi, Huerfano, and Counselor, to conduct informational meetings to allow residences the opportunity to identify adverse environmental impacts that may occur as a result of the proposed projects and reasonably future projects in the general area of DJR's leases. Because no Native American religious concerns are known to occur within the vicinity of the project area, further detailed analysis was not warranted. The proposed projects would be in compliance with the American Indian Religious Freedom Act of 1978 and Section 106 of the NHPA.
How would proposed ground-disturbing construction, operation, and maintenance activities impact paleontological resources?	Impacts to paleontological resources from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. SWCA consulted with the BLM FFO regarding the potential for paleontological resources to occur within the proposed project areas. The proposed projects are located within the Lybrook Fossil BLM specially designated area for paleontology and also in an area of known paleontological resources within the Nacimiento Formation (Potential Fossil Yield Classification [PFYC] 5). The BLM's geologist reviewed the project areas and determined that no surveys are needed because of the lack of exposure of unweathered or non-reworked geologic units, and concluded that paleontological clearance has been obtained and that project design features and BMPs (detailed in Appendix H) would mitigate impacts to paleontological resources to the point that detailed analysis is not warranted (BLM 2020b, 2020c). The Proposed Action would be in compliance with the Paleontological Resources Preservation Act of 2009.
How would proposed project activities impact range improvements and livestock mobility associated with the existing allotment within the proposed project areas?	Impacts to rangeland resources, including grazing allotments, from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The proposed project areas are located within the 47,698-acre Largo Community Allotment (No. 5083) and the 19,127-acre Escavada AMP Allotment (No. 6014). The Proposed Action would disturb 64.9 acres, which is 0.1% of the total allotments' acreage. The Proposed Action would not directly impact any existing range improvements or long-term trend plots. Project design features (detailed in Appendix H) would mitigate impacts to range improvements and livestock to the point that detailed analysis is not warranted.

Issue Statement	Rationale for Not Further Discussing in Detail in the EA
How would vegetation removal during proposed construction activities impact suitable foraging and nesting habitat for migratory birds?	Impacts to wildlife (including migratory birds) from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The BLM FFO manages approximately 435,500 acres within the Great Basin desert scrub plant community (BLM 2003b). The Proposed Action would result in the clearing of 64.9 acres migratory bird nesting and foraging habitat within sagebrush shrubland (which is part of the Great Basin desert scrub plant community). Migratory bird nest surveys will be performed prior to any construction activities (May 15–July 31). Active nests will be protected from proposed project activities. Any contaminated water that could impact birds will be covered or needed to minimize migratory bird mortality. Project design features (detailed in Appendix H of the EA) would mitigate impacts to a degree that detailed analysis is not warranted, if followed. The Proposed Action would be in compliance with the MBTA, if all management measures are followed.
How would vegetation removal and increased noise during proposed construction activities impact federally listed threatened, endangered, and candidate species?	Impacts to federally listed species from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. BLM/FFO performed biological surveys of the proposed project areas in July 2020 (NAU I01 and NAU E01), April 2020 (BTWU A35), and May 2020 (BTWU G34 and BTWU E35). The proposed project areas do not provide optimal habitat for any federally listed species (BLM 2018a, 2018b). There would be no new water depletions associated with the Proposed Action. Further detailed analysis is not warranted. The Proposed Action would be in compliance with the PRMP/FEIS and associated biological assessment (BLM 2002). No further consultation with the U.S. Fish and Wildlife Service (USFWS) is required.
How would vegetation removal and increased noise during proposed construction activities impact non-federal special-status species?	Impacts to special-status species from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The proposed project areas are not within suitable habitat for Clover's cactus (Sclerocactus cloverae) (BLM 2018a), which is listed by the BLM as a sensitive species (BLM 2017, 2018b). In 2016–2017, the previously determined subspecies Brack's hardwall cactus (Sclerocactus cloverae ssp. brackii) underwent a BLM-funded genetic study and classification review to inform the management of the cacti species and subspecies. The study determined that there is not a genetic foundation for the subspecies determination and the cacti should be classified under a single species as a cohesive genetic pool, Sclerocactus cloverae, common name Clover's cactus (BLM 2018c). SWCA and BLM/FFO performed biological surveys of the proposed project areas and the BLM/FFO has determined that there was no suitable habitat present for this species. However there is nesting habitat for burrowing owls within a prairie dog town within PPA. DJR shifted the preliminary access road and pipeline alignment to the NAU I01 and NAU E01 projects to avoid impacting prairie dog town. An active prairie dog colonies was observed along the proposed access road and pipeline for the BTWU G34, BTWU E35, and BTWU A35 project areas. The proposed access road and pipeline is located along an existing ROW; an alternative route was not feasible due to other active colonies within the area and the proposed pipeline is being placed adjacent to an existing water line (See biological survey reports). The BLM determined that the proposed project areas do not provide suitable habitat for Clover's cactus, as well as all other special-status plant species with potential to occur in the BLM FFO. The BLM also stated that because the BTWU G34, BTWU E35, and BTWU A35 access road and pipeline are located along an existing ROW, there may be some loss of prairie dog individuals, but overall, the impacts are minimal and there is no need to move the project away from the ROW (BLM 2020d). If ground- or vegetation-disturbing activities are scheduled to occur within the migratory bird nesting season (May 15–July 31), a pre-construction migratory bird nest and burrowing owl survey (4/1-8/1) of the proposed project areas would be performed. Project design features (detailed in Appendix H) would mitigate potential impacts to special-status species to the degree that detailed analysis is not warranted.

Issue Statement	Rationale for Not Further Discussing in Detail in the EA
How would proposed project activities impact the socioeconomics of the Nageezi and Counselor communities?	The proposed cluster project EA would provide positive socioeconomic benefit through the pooling of oil and gas resources. This pooling and unitization of resources would provide marginal positive benefit overall but would not represent a major change to the socioeconomic settings that are already in place in the Nageezi and Counselor Chapter region. Pooling and unitization are general legal structures which allow for the combination of mineral and/or oil and gas leasehold interests in order to accommodate agency regulatory requirements. Each of these "structures" provide for a defined method of sharing production among the interest owners in a combined area or unit and the maintenance of the leases included in the applicable unit by allowing operations on, or production from, anywhere on the unitized area. The Proposed Action would allow for greater pooling for the Nageezi and Counselor communities. New Mexico has enacted broad legislation regarding the establishment of spacing or proration units from which oil and gas may be produced with emphasis on protecting correlative rights without waste of oil or gas in the pool and the reservoir energy. To this end, the New Mexico Oil Conservation Division (NMOCD) has established statewide spacing and establishes field pool rules for specific spacing where the facts indicate the state spacing pattern should be altered to carry out the goal of protecting correlative rights and preventing waste. A recent update of NMOCD rules and regulations included an independent section for location of wells and spacing unit specific to horizontal wells. In that context, the NMOCD notices hearings when proposed horizontal spacing orders are being considered and solicits the input of the BLM. BLM will likewise involve the Bureau of Indian Affairs/Federal Indian Minerals Office for concurrence on their recommendations to the NMOCD. Even inside a unit, the operator is required to meet subsurface setbacks from the unit boundary and comply with specific configurations of the horizontal spacing unit.
How would proposed project activities and surface disturbance/presence of facilities impact the viewshed in the region?	Impacts to visual resources from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The Proposed Action is within Visual Resource Management (VRM) Class III (Class I allows the least modification, while Class IV allows the most) as prescribed and analyzed in the PRMP/FEIS (BLM 2003b), as amended. Within VRM Class III areas, the level of change to the landscape can be moderate, and management activities include partially retaining the existing character of the landscape. The level of change from the projects may attract attention but would not dominate the view (see key observation points in Figures D-21 thorough D.24 in Appendix D), and the Visual Contrast Rating worksheets completed for the proposed projects (Appendix K) indicate that the proposed projects would result in a weak to moderate contrast in the surrounding area, which is compatible with VRM Class III management objectives. DJR would camouflage all well pads and production equipment by painting them covert green, which would minimize impacts to the viewshed and scenic quality. Project design features (detailed in Appendix H) would mitigate visual impacts to a degree that detailed analysis is not warranted.
How would lighting associated with proposed construction activities impact stargazing potential within the surrounding area?	The proposed project areas are approximately 18 miles from Chaco Culture National Historical Park and thus would not impact stargazing from that area. Light-emitting sources associated with the construction phase of the proposed projects include lights around the working area, lights on the drilling rig (which may include lights on the derrick), vehicle traffic, and flaring. Lighting associated with the proposed projects would only occur between the hours of 6:00 a.m. and 6:30 p.m. These light sources would be temporary in nature and sporadically used. Night lighting would be used only during the 24-hour construction days during well completion, would last 1 to 2 weeks per well, and would be shielded or turned to the ground whenever possible. DJR will capture all gas from the proposed wells and convey the gas through the proposed gas pipeline to connect to their existing Chaco Trunk Gas pipeline; no flaring will occur on any of the proposed well pads. If flaring will be performed, and if it occurs at night would be limited to only days and times necessary for project completion. The necessity and duration for flaring varies from well to well and is difficult to predict. During operations, lighting would be limited to only that needed to conduct work safely. Project design features (detailed in Appendix H) would mitigate impacts to stargazing to a degree that detailed analysis is not warranted.

Issue Statement	Rationale for Not Further Discussing in Detail in the EA
How would noise and visual resource issues associated with the Proposed Action impact residences?	The residences nearest the proposed project areas range from approximately 0.25 mile north to 1.4 miles southeast. The nearest residence at 0.25 mile is located to the north of the BTWU E35 at a lower elevation and precludes impacts to this residence as it is located at the bottom of the cliff. The nearest residence to the BTWU G34 is approximately 0.4 mile east; construction traffic will not access the road associated with the residence. The nearest structure to the BTWU A35 is located 0.1 mile north and is a barn, not a residence. The nearest residence to the NAU I01 is approximately 0.9 mile south and will not be visible. The nearest residence to the NAU E01 is approximately 1.4 miles southeast and will not be visible. As stated above, the proposed projects would result in a weak to moderate contrast in the surrounding area, which is compatible with VRM Class III management objectives. The Proposed Action would result in an increase in truck traffic on the U.S. Highway 550 corridor and San Juan County Road 7900. Area roads are shared with residential properties and visitors to Chaco Culture National Historical Park. Traffic related to the proposed projects would be added to industrial traffic already present; there would be an additional approximately two to 33 roundtrips for heavy and light vehicles during the construction of the proposed projects. The current noise levels in the residential areas are assumed to be a mean value of 40 A-weighted decibel (dBA) average noise level (Ldn) (U.S. Environmental Protection Agency 1978). During most construction phases, the proposed projects are expected to temporarily increase daytime noise levels; however, the drilling and completion phases would potentially generate noise 24 hours per day until each phase is complete. Construction noise levels would increase from 40 dBA to a range of 55 to 68 dBA depending on the location of the noise receptor (BLM 2020e). In combination with ambient noise levels, the noise levels are expected to drop to approximately 43 dBA during the operations phase of the Proposed Action (BLM 2020e). A detailed analysis can be found in a recently permitted cluster project EA (DOI-BLM-NM-F010-2020-0029-EA) in close proximity to the Proposed Action and is incorporated herein by reference (BLM 2020e). Project design features (detailed in Appendix H) would mitigate impacts to any nearby residents to a degree that detailed analysis is not warranted.
What is the potential for the spread of noxious weeds and invasive plants as a result of the proposed projects?	The spread of weeds associated with BLM FFO–wide oil and gas development was analyzed in the PRMP/FEIS (BLM 2003b), as amended. Project design features (detailed in Appendix H) would mitigate the spread of weeds to the degree that detailed analysis is not warranted. The Proposed Action would be in compliance with the Federal Noxious Weed Act and New Mexico Executive Order 00-22.
What vegetation impacts would occur as a result of proposed ground-disturbing activities?	Impacts to upland vegetation from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The BLM FFO manages approximately 435,500 acres within the Great Basin desert scrub plant community (BLM 2003b). The Proposed Action, which would result in the clearing of 69.4 acres of sagebrush shrubland (which is part of the Great Basin desert scrub plant community), would impact approximately 0.1% of this community within the BLM FFO. Project design features (detailed in Appendix H) would mitigate impacts to vegetation to the degree that detailed analysis is not warranted.
How would storage and transportation of hydrocarbon liquids impact drinking water sources or surface waters?	The proposed wells would be drilled using a closed-loop system to contain drill cuttings and fluids. The total depth of the proposed well bores would be about 5,990 to 10,515 feet below the ground surface. The producing zone targeted by the Proposed Action is well below any underground sources of drinking water. All chemicals stored on-site would be properly contained. On-site containment structures such as containment dikes, containment walls, and drip pans would be impervious and would be maintained to prevent a discharge to waters of the U.S. BMPs would ensure that no materials are discharged into downstream jurisdictional water features. Project design features (detailed in Appendix H) would mitigate impacts to drinking water and surface waters to the degree that detailed analysis is not warranted.
What is the potential for impacts to oil and gas/energy production?	Impacts to oil and gas resources from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The commitment of these resources is also analyzed at the lease level. The Proposed Action would contribute to future mineral development within the NAU and BTWU. Further detailed analysis is not warranted.

Issue Statement	Rationale for Not Further Discussing in Detail in the EA
What are potential impacts from waste (hazardous materials) associated with ground-disturbing activities?	Project design features (detailed in Appendix H), as well as the adherence to Onshore Oil and Gas Operations regulations (43 CFR 3160), would mitigate impacts associated with waste to the degree that detailed analysis is not warranted.
How would the construction and operation phases of the proposed project impact recreation and access to BLM land (for uses such as hunting, fishing, shooting, etc.)?	Impacts to recreation from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The proposed project areas are not located within a specially designated recreation area. Dispersed recreation opportunities similar in type are readily available across a wide area in and around the Proposed Action. The proposed projects would not restrict recreation opportunities since recreation is dispersed throughout the area; therefore, detailed analysis is not warranted.
How would activities and facilities associated with the proposed project impact public access to BLM land?	Impacts to land and access from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. While public access roads and ROWs are present in the immediate area and would be used by personnel during all phases of the proposed projects, access to the public would not be restricted (other than the usage of potential, temporary flaggers, or other safety features). The presence of the proposed well pads would likewise not impact public use in the areas. Additionally, the use of mitigation measures will minimize the impacts and protect the existing ROWs. With standard design features and stipulations, no further analysis is needed.

2 Alternatives

2.1 Alternative 1 – Proposed Action Alternative

The Proposed Action is the BLM's approval of DJR's APDs and ROW grants as submitted, with COAs, design features, and applicable mitigation measures that are developed as a result of this analysis. As a result of BLM approval, the proposed development project(s) would take place. DJR would construct the NAU I01, NAU E01, BTWU G34, BTWU A35, and BTWU E35 well pads; horizontally drill, use, and plug between three and eight oil and natural gas wells per pad; and construct, use, and finally abandon the associated pipelines. Oil and produced water would be transported from the proposed pads along the proposed pipeline corridor to connect to DJR's existing NAU central liquids facility (CLF). Gas will be transported from the BTWU G34, BTWU A35, and BTWU E35 pads to DJR's existing Chaco Trunk Pipeline. When the oil and gas wells are plugged and abandoned and no longer needed, the respective facility pads and associated access roads would be reclaimed.

The surface features associated with each individual project would consist of between three and eight wellheads located on a well pad (including construction zone), an access road, and a pipeline. Additionally, NAU I01 and NAU E01 would have one staging area and three TUPs; and the BTWU G34, BTWU A35, and BTWU E35 would have one staging area and two TUPs. A temporary lay-flat surface water line would be placed along existing disturbance from DJR's existing NAU Water Source Well No. 7 during drilling and completion of all the wells. Details of each project can be found in the respective APDs and Surface Use Plans of Operations (SUPOs) on file with the BLM FFO, including additional construction and maintenance activity details.

The proposed projects may be constructed sequentially, not concurrently. NAU E01 would be constructed first, NAU I01 second, BTWU G34 third, BTWU E35 fourth, and BTWU A35 fifth. Therefore, surface disturbance associated with the overlapping components are deducted from the individual projects and total Proposed Action surface disturbance. The Proposed Action would result in a total of 64.9 acres of new surface disturbance located on BLM FFO surface. Of these, 39.7 acres would be fully reclaimed (reseeded and recontoured) during interim reclamation. The remaining 25.2 acres would remain disturbed

throughout the life of the projects and would be reclaimed when the wells are abandoned. Surface disturbance associated with the Proposed Action is summarized in Table 2.1 below.

Table 2.1. Proposed Action Surface Disturbance

Project Feature	Surface Disturbance (acres)	Interim Reclamation (acres)	Final Reclamation (acres)
NAU I01			
Access road and pullout	1.1	-	2.1
Well pad and construction zone	7.9	5.7	2.2
Liquids pipeline	1.0	1.0	-
3 TUPs	0	0	-
Staging area	0	0	-
Total	***10.0***	***6.7***	***4.3***
NAU E01			
Access road and pullouts	2.5	-	2.5
Well pad and construction zone	6.9	4.7	2.2
Liquids pipeline	2.3	2.3	-
Staging area	1.4	1.4	-
3 TUPs	0.4	0.4	-
Total	***13.5***	***8.8***	***4.7***
BTWU G34			
Access road and pullouts	8.3	-	8.3
Well pad and construction zone	6.9	4.7	2.2
Gas pipeline	5.0	5.0	-
Liquids pipeline	3.3	3.3	-
Staging area	1.3	1.3	-
2 TUPs	0.2	0.2	-
Total	***25.0***	***14.5***	***10.5***
BTWU E35			
Access road and pullouts	<0.1	-	<0.1
Well pad and construction zone	6.9	4.2	2.2
Gas pipeline	0	0	-
Liquids pipeline	0	0	-
Staging area	0	0	-
2 TUPs	0	0	-
Total	***6.9***	***4.2***	***2.2***
BTWU A35			
Access road and pullouts	1.8	-	1.8
Well pad and construction zone	6.6	4.4	2.2
Gas pipeline	1.1	1.1	-
Liquids pipeline	0	0	-

Project Feature	Surface Disturbance (acres)	Interim Reclamation (acres)	Final Reclamation (acres)
Staging area	0	0	-
2 TUPs	0	0	-
Total	***9.5***	***5.5***	***4.0***
Proposed Action Total	***64.9***	***39.7***	***25.2***

2.1.1 Access Roads

The five access roads would be constructed in accordance with the BLM Gold Book Standards and BLM 9113-1 (Roads Design Handbook) and BLM 9113-2 (Roads National Inventory and Condition Assessment Guidance and Instructions Handbook). Each access road would be constructed with a 14- foot-wide running surface with the bottoms of the 8-foot-wide bar ditches along each side of the access road that would remain disturbed throughout the life of the project; this acreage would be reclaimed during final reclamation.

Additionally, there would be a total of eleven 150-foot-long, 20-foot-wide (<0.1-acre) pullouts along portions of the access roads, totaling approximately 0.8 acre. See Table 2.1 for each proposed project's components and associated surface disturbance; the overlapping acreages were subtracted out of the total acreage of impacts.

2.1.2 Well Pads and Construction Zones

The well pads, which vary in size and shape, would include a 50-foot-wide construction zone surrounding the well pad's perimeter. The working area for each pad (approximately 2.2 acres) would remain disturbed throughout the life of the projects; this acreage would be reclaimed during final reclamation. The remaining disturbed areas of the well pads and construction zones would be reseeded and recontoured during interim reclamation. See Table 2.1 for each proposed project's components and associated surface disturbance.

2.1.3 Pipelines

There would be a total of approximately 38,110 feet of pipeline corridors constructed that parallel and are adjacent to (overlap) the proposed access roads and existing Lybrook Resource Road. Portions of the pipeline corridors would also overlap sections of well pad construction zones and TUPs. The overlapping acreages were subtracted from the total acreage of impacts; therefore, the acreages included in Table 2.1 above reflect the actual disturbance and no overlap. All pipeline disturbance would be reseeded and recontoured during interim reclamation.

2.1.4 Temporary Use Permit Areas

A total of three TUPs would be associated with NAU I01 and NAU E01: two where the pipeline would cross the Lybrook Resource Road and existing pipelines; and one to connect the liquids pipeline to the existing infrastructure tie-point to the NAU CLF. A total of two TUPs would be associated BTWU G34, BTWU A35, and BTWU E35: one for the gas pipeline to cross an existing water pipeline; and one for the proposed liquids pipeline to connect to the NAU CLF tie-in point. The TUPs would be reclaimed during interim reclamation. See Table 2.1 for each proposed project's components and associated surface disturbance.

2.1.5 Temporary Lay Flat Surface Line

A temporary surface lay-flat water completion line would be used to transport water during well completion activities on all proposed projects. The lay-flat water line will begin at DJR NAU WSW No.7 and be located along the bar ditches of the access roads in previously disturbed areas. There would be no new surface impacts associated with the lay-flat line.

2.1.6 Staging Areas

There would be two staging areas associated with the Proposed Action. The staging areas would be used for pipeline boring, construction equipment, and soil stockpiling. All of the disturbance associated with the staging areas would be reclaimed during interim reclamation. See Table 2.1 for each proposed project's components and associated surface disturbance.

2.1.7 Construction, Drilling, and Completion

Prior to construction, the proposed project areas would be staked to ensure that all activity would be confined to authorized areas. Staking would be maintained for the duration of construction activities.

The construction phase is anticipated to begin April 1, 2021, after the BLM's approval of the APDs and ROW grants. Each proposed project would take approximately 3 to 4 months to complete, which includes access road and well pad construction, pipeline construction, and well drilling and completion. Within the 3 to 4 months of construction activities, it would take 4 to 6 weeks to construct the access road and well pad, 3 to 4 weeks for pipeline construction, and 1 to 2 weeks per wellhead (which could total 8 to 16 weeks for eight wells on one well pad). If construction occurs sequentially, the total cumulative amount of time it would take to complete construction of the Proposed Action (the NAU E01, NAU I01, BTWU G34, BTWU A35, and BTWU E35 well pads) would be approximately 16 to 24 months; however, construction may take place concurrently.

Equipment mobilization and demobilization would consist of six to eight transport truckloads to deliver and remove heavy equipment to and from each proposed project area; this equipment would remain on-site until construction is complete. During construction of the access roads, well pads, and pipelines, it is estimated that 20 to 30 construction personnel would be on-site 6 days per week (Monday–Saturday) between the hours of 6:00 a.m. and 6:30 p.m.; they would be transported to and from the site by 10 to 15 standard-size pickup trucks. Construction personnel would be on-site 24 hours per day/7 days per week during the well drilling and completion phase for each proposed project.

Construction equipment may include chainsaws, a brush hog, scraper, maintainer, excavator, dozer, backhoe, hydrovac, welder, trencher, side-boom, and miscellaneous specialty equipment. Standard drilling operation equipment includes drilling rig with associated equipment, temporary office trailers equipped with sleeping quarters for essential company personnel, toilet facilities, and trash containers.

Following construction activities, interim reclamation would occur within portions of the proposed project areas not required for long-term operation. DJR would adhere to any conditions required by the BLM FFO. A list of design features, also captured in the SUPOs, and best management practices (BMPs) that DJR has committed to, is provided in Appendix H.

2.1.8 Operation

The projected in-service date is September 1, 2021. The anticipated lifespan of the Proposed Action is 20 years.

The production equipment for each proposed project area will include up to five compressor engines, three electric engine, four indirect heaters, three vapor recovery towers, eight 400-barrel (bbl) comingled liquid storage tanks, two enclosed combustion devices, and pneumatics.

2.1.9 Final Reclamation

When a proposed well(s) are no longer needed, they would be plugged and abandoned as approved by the BLM. Final reclamation of the proposed pad would take place within all disturbed portions of the Proposed Action, once all the wells on that particular well pad have been plugged and abandoned and is detailed in each proposed project's SUPO on file with the BLM.

2.2 Alternative 2 – No Action Alternative

Under this alternative, the BLM would deny approval of the APDs and ROW grants. DJR would retain its lease rights, but the Proposed Action would not occur. Production in the area would continue at its current rate, and other current land use in the area would continue. The No Action Alternative is presented as the baseline for impacts analysis in Chapter 3 (Affected Environment and Environmental Consequences).

3 Affected Environment and Environmental Consequences

3.1 Issue 1: How would emissions generated by equipment associated with the Proposed Action impact air quality?

3.1.1 Affected Environment

Air quality is determined by the quantity and chemistry of atmospheric pollutants in consideration of meteorological factors (i.e., weather patterns) and topography, both of which influence the dispersion and concentration of those pollutants. The analysis area for impacts on air quality consists of San Juan, Sandoval, Rio Arriba, and McKinley Counties. This spatial scope of analysis was identified based on the regional nature of air pollution and to facilitate analysis using the best available air quality data, which are generally provided at the county level. Much of the information referenced in this section is incorporated by reference from the BLM 2019 *Air Resources Technical Report for Oil and Gas Development: New Mexico, Oklahoma, Texas and Kansas* (herein referred to as the Air Resources Technical Report) (BLM 2020f).

3.1.1.1 NATIONAL AMBIENT AIR QUALITY STANDARDS

The Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. Primary standards provide public health protection, and secondary standards provide for public welfare, including protection against degraded visibility and damage to animals, crops, vegetation, and buildings (EPA 2020a). The primary NAAQS are set at a level to protect public health, including the health of at-risk populations, with an adequate margin of safety (EPA 2020a). The EPA has set NAAQS for seven principal pollutants ("criteria" air pollutants): carbon monoxide (CO); nitrogen dioxide (NO_2); ozone (O_3); particulate matter equal to or less than 10 microns in diameter (PM_{10}); particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$); sulfur dioxide (SO_2); and lead (Pb) (EPA 2015). The EPA has delegated the responsibility of regulation and enforcement of the NAAQS to the state level and has approved the New Mexico State Implementation Plan (SIP), which allows the State to enforce

both the New Mexico Ambient Air Quality Standards (NMAAQS) and the NAAQS on all public and private land with the exception of tribal land and land within Bernalillo County. The New Mexico Environment Department (NMED) Air Quality Bureau is responsible for implementation of the SIP and enforcement of air quality standards (NMED 2020a).

Areas that are in attainment of the NAAQS are categorized as either Class I, Class II, or Class III, which determines the increment of air quality deterioration allowed. All areas that attain the NAAQS and are not specifically designated as Class I areas under the CAA are considered to be Class II for air quality, under which a moderate amount of degradation is permitted. The analysis area is in attainment for the NAAQS and the NMAAQS and is categorized as a Class II area (EPA 2020b; NMED 2018).

Design values are statistics that describe the air quality in a certain area relative to the NAAQS; they are to be consistent with NAAQS as defined in 40 CFR 50. Design values are generally used to classify and designate non-attainment areas (EPA 2020c). The measurement parameters for each air monitor vary depending on the criteria pollutant being monitored, the scale at which that pollutant is being measured, the duration and frequency of the monitoring sample, and the monitor objective. CAA regulations establish design criteria for ambient air quality monitoring networks (also known as state and local air monitoring stations), including "scales of representativeness of most interest" for monitoring sites, ranging from national and global scales down to the local level (EPA 2012). Table 3.1 summarizes the design value concentrations of criteria pollutants within the analysis area, compared with the NAAQS and NMAAQS. The counties in the analysis area do not currently monitor for CO, Pb, or $PM_{2.5}$; however, because the counties are relatively rural in character, it is likely that these pollutants are not elevated.

Table 3.1. Design Values for Counties within the Analysis Area

Pollutant	2019 Design Concentrations	Averaging Time	NAAQS	NMAAQS [a,b]
O_3	Rio Arriba County: 0.067 ppm Sandoval County: 0.068 ppm San Juan County: 0.070 ppm: three stations; Bloomfield at 0.069 ppm, Navajo Dam at 0.070 ppm, Shiprock at 0.069 ppm	8-hour	0.070 ppm [a]	–
NO_2	San Juan County: three stations; Bloomfield at 10 ppb, Navajo Dam at 6 ppb, Shiprock at 3 ppb	Annual	53 ppb [b]	50 ppb
NO_2	San Juan County: Bloomfield at 34 ppb	1-hour	100 ppb [c]	–
SO_2	San Juan County: 2 ppb	1-hour	75 ppb [c]	–
PM_{10}	San Juan County: Invalid monitor data [e]	24-hour	150 µg/m^3 [d]	–

Source: EPA (2020a)

ppm = parts per million, ppb = parts per billion, µg/m^3 = micrograms per cubic meter

[a] Annual fourth highest daily maximum 8-hour concentration, averaged over 3 years.

[b] Annual mean.

[c] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.

[d] Not to be exceeded more than once per year on average over 3 years.

[e] PM_{10} monitor stations currently show installed locations in the planning area (San Juan County); however, the monitor status of these stations show invalid data and cannot be used to represent design values.

[f] The NMAAQS standard for total suspended particulates, which was used as a comparison with PM_{10} and $PM_{2.5}$, was repealed as of November 30, 2018.

[g] While there are no NAAQS for hydrogen sulfide (H_2S), New Mexico has set a 1-hour standard for H_2S at 0.010 ppm for all areas of the state outside of the area within 5 miles of the Pecos-Permian Air Quality Control Region (BLM 2020f).

Ozone, Nitrogen Oxides, and Volatile Organic Compounds

O_3 is a criteria pollutant that is of most concern for the analysis area. Breathing O_3 can have human health impacts, particularly for sensitive groups (children, the elderly, and those with chronic lung conditions

like bronchitis, emphysema, and asthma), as well as sensitive vegetation (NMED 2020a). O_3 is most likely to reach unhealthy levels on hot, sunny days in urban environments and can be transported long distances by wind into rural areas (EPA 2020d). As a secondary pollutant, O_3 is not a direct emission pollutant (i.e., it is not emitted directly into the air), but it is the result of chemical reactions between a group of highly reactive gases called nitrogen oxide(s) (NO_x) and volatile organic compounds (VOCs), which are organic compounds that vaporize (i.e., become a gas) at room temperature when exposed to sunlight (EPA 2020d). O_3 and NO_2 are criteria air pollutants and therefore are regulated under the NAAQS and NMAAQS; VOCs are not regulated; however, because O_3 is not a direct emission, emissions of NO_x (particularly NO_2, which is used as an indicator for the larger group of gases) and VOCs are used as a proxy for determining potential levels of secondary formation of O_3. NO_x can also react with other chemicals in the air to form particulate matter, contributing to haze (EPA 2020b). Major sources of emission for both NO_x and VOCs include industrial facilities like power plants and motor vehicle exhaust (including off-road equipment). NO_x is primarily emitted through fossil fuel combustion in electric utilities, high-temperature operations at other industrial sources, and the operation of motor vehicles (EPA 2020b). VOCs are emitted from burning fuels (gasoline, wood, coal, or natural gas) and are associated with refineries, oil and gas production equipment, and other industrial processes. VOCs are also released from chemicals like solvents, paints and thinners, adhesives, air fresheners, copy machines and printers, cleaners and disinfectants, and other consumer products (EPA 2020e). Biogenic sources, such as trees and plants, can also represent a substantial portion of NO_x and VOC emissions in an area, including New Mexico (BLM 2020g). The upstream sources of VOCs that are produced during the production of oil and gas are during the separation of gases from liquids and the storage process. Such emissions are generally controlled with the use of enclosed combustion devices, such as flares. Leaks and ineffective control systems are also a source of VOC emissions. In the event that VOCs are produced from incomplete combustion, they become more highly reactive O_3 precursors (Matichuk et al. 2016).

Monitoring conducted by the NMED (under the EPA) in the analysis area indicates that levels of O_3 have come close to, but have not yet exceeded, the NAAQS in San Juan County. If such exceedances were to occur, the area would be designated as being in "nonattainment," which could impact industrial development for the area (NMED 2020b). The NMED Air Quality Bureau has begun developing an Ozone Attainment Initiative, which, if implemented on schedule, will have a plan in place by winter 2020/2021. The Ozone Attainment Initiative plan will set standards for emission sources that contribute to the exceedance of design values of 95% or more, in particular to control NO_x and VOCs to achieve maintenance or attainment of the standards pursuant to New Mexico Statutes 74-2-5.3 (NMED 2020c).

Particulate Matter

Particulate matter (also known as particle pollution) is a mixture of solid particles and liquid droplets in the air. Particulate matter varies in size. PM_{10} refers to particulate matter 10 micrometers or less in diameter (commonly considered "dust"). $PM_{2.5}$ refers to particulate matter that measures 2.5 micrometers or less (i.e., fine particles) and is the main cause of reduced visibility (haze) in the United States (EPA 2020f). The EPA regulates inhalable particulate matter 10 micrometers in diameter or smaller (PM_{10} and $PM_{2.5}$) because they are inhalable into the lungs (NMED 2020d) but does not regulate particles larger than 10 micrometers in diameter (such as sand and larger dust particles). $PM_{2.5}$ is not currently monitored in the analysis area, and there are no areas of high concentrations that would warrant monitoring by the NMED.[1] Recent monitoring for PM_{10} (dust) in the analysis area began in 2017 at the 1H Substation. Like O_3, most particulate matter is formed by reactions between other chemicals,

[1] There is one recently inactive neighborhood monitor for $PM_{2.5}$ (fine particulate matter) in the analysis area located at the NMED office in Farmington (with a last sample date of December 29, 2015). It is assumed that operation of this monitor was discontinued after 2015 with approval from the EPA because the affecting sources had been shut down. Other air monitors for $PM_{2.5}$ in the analysis area that are currently inactive went out of operation more than 10 years ago. The inactive monitors measured $PM_{2.5}$ levels at the neighborhood scale; none of the inactive monitors measured regional $PM_{2.5}$ levels.

specifically between SO_2 and NO_x, which are emitted from vehicles, power plants, and other industrial processes (EPA 2020f). Particulate matter emissions often result from activities like construction, traffic on unpaved roads, fields, and wildfires (EPA 2020f). Particulate matter is of heightened concern when emissions are near sensitive receptors, such as residences, because particulate matter can be present in higher concentrations in a localized area prior to settling or dispersion.

3.1.1.2 HUMAN-CAUSED EMISSIONS

Along with criteria pollutant concentrations as measured by air monitors, the EPA provides data on human-caused criteria pollutant emissions, expressed in tons per year or total volume of pollutant released into the atmosphere. Human-caused emissions data point to those industries and/or practices that are contributing the most to the general level of pollution (BLM 2020g). Total human-caused emissions within the analysis area are reported in Table 3.2, based on 2014 National Emissions Inventory (NEI) in tons per year (EPA 2014a).

These emissions are primarily the result of electrical power generation, oil and gas development, vehicles (highway and off-highway traffic), and other industrial activities (EPA 2014a). The primary sources of several criteria air pollutants in the analysis area are two coal-fired electrical generation units: the San Juan Generating Station (15 miles west of Farmington, New Mexico) and the Four Corners Power Plant (on the Navajo Nation near Fruitland, New Mexico). These electrical generation units are the primary source of SO_2, NO_x, and $PM_{2.5}$ in the analysis area (BLM 2020f; EPA 2014a). Oil and gas development is also a prominent source of emissions. There are approximately 23,034 active oil and gas wells in the New Mexico portion of the San Juan Basin, which has been a producing oil and natural gas field since the early to middle 1900s. About 16,139 of the wells in the aforementioned counties are federal wells, with the remainder falling in other jurisdictions (BLM 2020g). Over the last 5 years, there have been 243 federal well completions, all of which occurred within the BLM FFO (BLM 2020g).

The Western States Air Resources Council–Western Regional Air Partnership (WESTAR-WRAP) conducted an oil and gas emissions inventory report for base year 2014 to further clarify the contributions of oil and gas activities to human-caused emissions within the Permian and San Juan Basins. The results indicate that there are non-point sources, including fugitive components, pneumatic devices, pumps, and well blowdown events, that may not be reported through the state and federal inventories. These nonpoint sources could represent greater criteria, hazardous air pollutants (HAPs), and greenhouse gas (GHG) emissions within these basins, in particular VOC and NO_x emissions that contribute to O_3 formation. It is therefore believed that the 2014 NEI data in Table 3.2 related to petroleum and related industries are underreported in terms of VOC and NO_x emissions. Table 3.2 provides a comparison of the NEI and WESTAR-WRAP data sets.

As shown in the table, a comparison of data sets indicates that oil and gas development–related NO_x and VOC emissions may be underreported by approximately 58% and 49%, respectively.

Table 3.2. Human-Caused Emissions in the New Mexico Portion of the San Juan Basin

Emissions	Emissions (tons per year)					
	NO_X	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2
2017 NEI—all sources	54,803	180,126	147,126	41,817	14,181	5,185
2017 NEI—petroleum and related industries	23,770	–	71,982	–	–	–
WESTAR-WRAP 2014 oil and gas sources	44,433	–	86,173	–	–	–

Sources: EPA (2014a); Ramboll Environ (2017). Includes data for San Juan, Sandoval, Rio Arriba, and McKinley Counties.

Notes: Values include Tier 1 summaries for each county, including combustion, industrial, on-road/non-road, and miscellaneous sectors. Biogenic sources are not included.

Only precursor pollutants to O_3 formation are compared in this analysis (NO_x and VOCs).

The data above do not consider the following changes in operations at the San Juan Generating Station (a four-unit, coal-fired generator) and the Four Corners Power Plant (a five-unit, coal-fueled generator) to meet the requirements of the federal regional haze rule:

- In 2016, two of the four units at the San Juan Generating Station had selective catalytic reduction technology installed to satisfy Best Available Retrofit Technology (BART) requirements from the EPA (Enchant Energy 2019). The installation of selective catalytic reduction technology is estimated to result in a 67% reduction in SO_2, 62% reduction in NO_x, 50% reduction in particulate matter, 44% reduction in CO, 51% reduction in VOCs, 50% reduction in CO_2, and 50% reduction in mercury (BLM 2020g). In December 2017, the two units that did not meet the BART requirements were closed. In March 2018, an explosion at one of the two remaining units rendered it inoperable (*Navajo Times* 2018).
- In 2013, three of the five units at the Four Corners Power Plant were shut down. In mid-2018, the two remaining units had selective catalytic reduction technology installed to satisfy BART requirements from the EPA (*Power Magazine* 2019). It is estimated that this retrofit will result in a 36% reduction in NO_x, 61% reduction in mercury, 43% reduction in particulate matter, 30% reduction in CO_2, and 24% reduction in SO_2 (BLM 2020g).

3.1.1.3 AIR QUALITY INDEX

The level of emission for a pollutant, in consideration of weather and geographical influences, is a key factor affecting the concentration of that pollutant in an area. Emissions, which contribute to concentrations, can be understood through the Air Quality Index (AQI). The AQI is used to report daily air quality information in an easy-to-understand way by explaining how local air quality relates to human health. Calculated by the EPA, the AQI considers the following: O_3, particulate matter ($PM_{2.5}$ and PM_{10}), NO_2, SO_2, and CO. According to the EPA, O_3 and particulate matter, both calculated daily for the AQI, are the two air pollutants that pose the greatest threat to human health (AirNow 2016). The higher the AQI value, the greater the level of air pollution and the greater the concern for public health. An AQI value of 100 typically corresponds to the NAAQS set for that pollutant, and values below 100 are considered satisfactory for public health. The AirData AQI interactive map and summary report (EPA 2020g) provides annual summary information, including maximum AQI values and the count of days in each AQI category. Table 3.3 provides a summary of the number of days classified above 100 (unhealthy for sensitive groups or worse) for the counties in the analysis area for the period from 2008 through 2018.

Table 3.3. AQI Summary Data for Number of Days Classified above 100 for the Analysis Area (2008–2019)

County	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
San Juan	3	0	20[a]	18	12	6[b]	0	2	2	6	16	0
Sandoval	0	0	0	0	0	0	0	0	0	1	12	0
Rio Arriba	0	0	0	0	0	2	0	0	0	3	3	0
McKinley	0	0	0	0	0	0	–	–	–	–	–	-

Source: EPA (2020g)

Note: All AQI values presented are classified as unhealthy for sensitive groups (101–150), unless otherwise indicated. Annual summary data for McKinley County are only available for 2008–2013.

[a] Including 5 unhealthy days (above 150) and 2 very unhealthy days (above 200).

[b] Including 1 unhealthy day (above 150).

For the reporting period, San Juan County had the most incidences of the number of days classified above 100 annually, including 8 days reaching unhealthy (7 days above 150) to very unhealthy (2 days above 200) for everyone. These days occurred in 2010 (5 unhealthy days and 2 very unhealthy days) and 2013 (1 unhealthy day). While there are exceedances of NAAQS on those days with AQI values over 100, these exceedances do not represent a trend of degrading AQI values over time (BLM 2020g).

3.1.1.4 HAZARDOUS AIR POLLUTANTS

The CAA requires control measures for HAPs, which are a class of 187 toxic air pollutants that are known or suspected to cause cancer or other serious health impacts and/or adverse environmental impacts. National Emissions Standards for Hazardous Air Pollutants (NESHAPs), established by the EPA, limit the release of specified HAPs from specific industries (BLM 2020g). NESHAPs for oil and gas development include control of benzene, toluene, ethyl benzene, mixed xylenes, and n-hexane from major sources, and benzene emissions from triethylene glycol dehydration units as area sources (BLM 2020g). The CAA defines a major source for HAPs as being one that emits 10 tons per year of any single HAP or 25 tons per year of any combination of HAPs. Under state regulations, a construction or operating permit may be required for a major source and, for New Mexico, determining a major source requires consideration of each oil and gas exploration and production well individually (BLM 2020g). In New Mexico, regulations for major sources are found under 20.2.70 and 20.2.71 New Mexico Administrative Code (NMAC).

The Air Resources Technical Report discusses the relevance of HAPs to oil and gas development and the particular HAPs that are regulated in relation to these activities (BLM 2020f). The EPA conducts a periodic National Air Toxics Assessment (NATA) that quantifies HAP emissions by county in the United States. A review of the results of the 2014 NATA shows that cancer, neurological risks, and respiratory risks in the analysis area (San Juan, Sandoval, Rio Arriba, and McKinley Counties) are generally lower than statewide and national levels, as well as those for Bernalillo County, where urban sources are concentrated in the Albuquerque area (EPA 2014b).

3.1.2 Environmental Impacts – No Action Alternative

Under the No Action Alternative, the BLM would deny approval of the APDs and ROW grants. DJR would retain its lease rights, but the Proposed Action would not occur. Production in the area would continue at its current rate, and other current land use in the area would continue. No resulting impact to air quality or increases in fugitive dust would occur.

3.1.3 Environmental Impacts – Proposed Action

Construction activities associated with the Proposed Action would result in emissions from the operation of internal combustion engines, as well as the emission of particulates (specifically PM_{10}) associated with fugitive dust from drilling and the operation of vehicles and equipment on unpaved roads. The Air Resources Technical Report estimates that PM_{10} emissions from these construction activities would be approximately 2.4 tons per year for one oil and natural gas well. These emissions would be temporary (approximately 3–4 months for each well pad, which would not necessarily be developed concurrently, with a cumulative total of approximately 16–20 months), would rapidly disperse, and would be minimized through application of air resource-protection design features (see Appendix H). As such, construction associated with the Proposed Action is unlikely to contribute to a violation of air quality regulations.

Operation activities associated with the development of the Proposed Action would result in annual increased criteria pollutant emissions, including increased particulate matter (fugitive dust) from operational road traffic; exhaust emissions from equipment, compressor engines, generators, and flares;

and VOCs resulting from oil storage activities. The 23 oil wells would emit the majority of operational emissions associated with the proposed projects; any other emissions (such as fugitive dust from the well pads or fugitive emissions from the five pipeline corridors) would be minimized through design features. Please reference the SUPOs on file with the associated APDs and ROW grants for more details on minimalizing fugitive emissions. Table 3.4 shows estimated modeled annual emissions from operation of the 23 oil wells and the percent increase in criteria pollutants over existing conditions. Emissions calculations in Table 3.4 are based on preliminary engineering. While design refinements may affect some individual criteria pollutant emissions, the overall emissions reported below are a conservative estimate and it is expected that any changes as a result of final engineering would reduce overall emissions. See Appendix I for the preliminary draft emissions summary tables submitted to NMED; the complete NMED Air Quality Emission Applications are on file with NMED.

Table 3.4. Annual Emissions from Operation of the Well Pad and Wells

	Emissions (tons per year)					
Emissions	**NO_x**	**SO_2**	**CO**	**VOCs**	**PM_{10}**	**$PM_{2.5}$**
Current human-caused emissions (San Juan, Sandoval, Rio Arriba, and McKinley Counties)	54,803	5,185	180,126	147,126	41,817	14,181
Emissions from NAU 2208 and BTWU 2308 cluster oil and natural gas wells (23 wells) [a]	105.16	0.23	191.53	414.00	7.76	7.32
Increase	0.190%	0.004%	0.110%	0.281%	0.0186%	0.052%

[a] DJR (2020a). See Appendix I for more details.

The CAA defines a major source for HAPs as being one that emits 10 tons per year of any single HAP or 25 tons per year of any combination of HAPs. As each well pad project would be permitted separately, DJR estimates that HAP emissions would be up to 5.49 tons per year per proposed project (DJR 2020a). The emissions reported above include those from the NAU 2208 and BTWU 2308 Cluster Oil and Natural Gas Wells Project if all five well pads and 23 wells were constructed concurrently; however, these wells are not likely to be developed at once and would be considered a minor source unit as each well pad (proposed project) may be permitted under a General Construction Permit according to 20.2.72 NMAC. See Appendix I for the preliminary draft emissions summary tables. Because the increase in overall emission levels would be low (0.003%–0.442%), development of the Proposed Action would not be expected to increase the number of days classified above 100 (unhealthy for sensitive groups, or worse). Therefore, it is not anticipated that the Proposed Action would result in a change in the AQI for the analysis area. This incremental increase would not be expected to result in exceeding the NAAQS or state air quality standards for any criteria pollutants in the analysis area.

3.1.4 Cumulative Impacts

3.1.4.1 CUMULATIVE IMPACT AREA

The cumulative impact area for this analysis is the New Mexico portion of the San Juan Basin.

3.1.4.2 PAST AND PRESENT ACTIONS

Current annual estimated emissions (see Tables 3.2 and 3.5) are reflective of the effects of past and present actions. Two major sources of criteria pollutant and VOC emissions are the San Juan Generating Station and the Four Corners Power Plant (BLM 2020g); however, the 2017 shutdown of two of the four units at the San Juan Generating Station and the 2016 and 2018 retrofitting of the remaining units both at

the San Juan Generating Station and the Four Corners Power Plant are expected to decrease emissions substantially (see Section 3.1.1.2).

Oil and gas development is also a prominent source of emissions. There are approximately 23,034 active oil and gas wells in the New Mexico portion of the San Juan Basin; of these, 16,139 are federal wells. There have been 243 federal well completions in the FFO over the last 5 years (see Section 3.1.1.2). While there are exceedances of NAAQS on those days with AQI values over 100 (see Table 3.3), these exceedances do not represent a trend of degrading AQI values over time (BLM 2020g).

3.1.4.3 REASONABLY FORESEEABLE FUTURE ACTIONS

The Reasonably Foreseeable Development Scenario for Oil and Gas Activities: Mancos-Gallup Resource Management Plan Amendment (RMPA) Planning Area, Farmington Field Office, northwestern New Mexico (2018 RFD) (Crocker and Glover 2018) was used to determine the number of oil and gas wells in the Mancos-Gallup RMPA Planning Area; this planning area includes most of the FFO and is where most potential oil and gas development is assumed to occur. The BLM considers the 2018 RFD to contain the most accurate information about the reasonably foreseeable number of wells and surface disturbance for the New Mexico portion of the San Juan Basin. Continued oil and gas development is a prominent reasonably foreseeable future action impacting air quality in the analysis area. The 2018 RFD estimates that there could be an additional 3,200 wells drilled within the analysis area by 2037 (Crocker and Glover 2018), or about 160 wells per year. Annual emissions associated with the RFD are disclosed in Table 3.5.

PNM announced its intent to close the San Juan Generating Station in 2022, when the coal supply agreement expires. However, the City of Farmington has indicated interest in retaining ownership post-2022 and has teamed with Enchant Energy to repurpose the San Juan Generating Station into a commercial-scale carbon-capture utilization and sequestration facility and wholesale power generator (Enchant Energy 2019). A July 2019 pre-feasibility study recommended development of a more in-depth front-end engineering and design study (Sargent and Lundy 2019). The Los Alamos National Laboratory completed an independent assessment of post-combustion capture of carbon dioxide (CO_2) in December 2019. The assessment determined that using an amine-based capture system is a technically viable option that is commercially available and has been demonstrated to provide greater than or equal to 90% CO_2 capture out of a continuous flue gas stream (Los Alamos National Laboratory 2019). Given the uncertainties around this project, expected reductions in emissions are not included in the cumulative impact emissions disclosed below.

The NMED Air Quality Bureau has begun developing an Ozone Attainment Initiative to set standards for emission sources that contribute to the exceedance of design values of 95% or more, in particular to control NO_x and VOCs to achieve maintenance or attainment of the standards pursuant to New Mexico Statutes 74-2-5.3 (NMED 2020a).

3.1.4.4 CUMULATIVE IMPACT ANALYSIS

Table 3.5 quantifies annual emissions from past, present, and reasonably foreseeable future actions in conjunction with the operation of the Proposed Action.

The development of the proposed NAU 2208 and BTWU 2308 cluster oil and natural gas wells would result in an incremental increase in overall emission levels between 0.270% and 3.061% of existing emissions. With the exception of VOCs, the Proposed Action would generally comprise a small percentage of cumulative emissions. Emissions associated with the 2018 RFD are anticipated to be at the most acute level during well construction and completion phases; because not all wells would be constructed at the same time, it is anticipated that the incremental addition of criteria pollutants and VOCs may be lower than reported above. Accordingly, the cumulative impacts disclosed above are not expected

to result in any exceedances of the NAAQS or NMAAQS for any criteria pollutants in the analysis area. Because the increase in overall emission levels would be low (3.061% or less), development of the Proposed Action in conjunction with other reasonably foreseeable future actions would not be expected to increase the number of days classified above 100 (unhealthy for sensitive groups, or worse).

Table 3.5. Cumulative Air Emissions from Oil and Gas Development

	Emissions (tons per year)					
	NO_x	SO_2	CO	VOC	PM_{10}	$PM_{2.5}$
Current human-caused emissions (New Mexico portion of San Juan Basin)	54,803	5,185	180,126	147,126	41,817	14,181
Total annual emissions from the RFD (160 wells/year)	961.60	17.60	408.00	2,456	849.60	131.20
Construction and operations of the NAU 2208 and BTWU 2308 cluster oil wells [b]	105.16	0.23	191.53	414.00	7.76	7.32
Total	1,066.76	17.83	599.53	2,870.00	857.36	138.52
Increase	1.947%	0.344%	0.333%	1.951%	2.050%	0.977%
Contribution of Proposed Action to total annual cumulative impact	9.858%	1.290%	31.947%	14.425%	0.905%	5.284%

[a] The representative well used to calculate emissions is a horizontal oil well. Emissions for vertical wells were not used from this analysis due to current predominance in horizontal technological drilling methods and because presenting horizontal oil wells emissions estimates represents a more conservative summary of emissions, compared with emissions from a vertical well, with the exception of SO_2, which could be four to five times greater in a vertical well scenario. However, SO_2 emissions are still estimated to be within the same magnitude and less than 1 ton per year of SO_2 emissions per well. Because oil wells are the predominant type of well in the FFO area, this analysis assumes that all the developed wells will be oil wells. Gas well emission factors are shown as well for comparison. See Appendix G for additional discussion of emission factors.

[b] DJR (2020a). See Appendix I for more details.

Additionally, emissions associated with the 2018 RFD scenario and development of the Proposed Action would be offset by substantial decreases in emissions in the power generation sector resulting from shutdown of two of the units at the San Juan Generating Station, and the installation of selective catalytic reduction technology at both the San Juan Generating Station and the Four Corners Power Plant; these changes are not yet accounted for in current human-caused emissions estimates. Emissions may also be reduced through the Ozone Attainment Initiative. Cumulatively, it is expected that future levels of criteria pollutant, VOC, and HAP emissions would be lower than current levels due to the aforementioned factors, despite the increases in emissions associated with reasonably foreseeable oil and gas development and the Proposed Action.

3.1.5 Mitigation and Residual Impacts

Design features (detailed in Appendix H) have been established to minimize dust by limiting surface disturbance, requiring interim reclamation, and requiring dust control on dirt roads. These design features include limiting NO_x emissions from compressors with engines of 300 horsepower or less, revegetating areas not needed for proposed project facilities, and spraying dirt roads. As such, no additional mitigation is proposed, and residual impacts would be the same as described in Section 3.1.3 (Environmental Impacts – Proposed Action). As described in that section, residual construction impacts would be temporary and would rapidly disperse. Residual operations impacts would be generally limited to those associated with emissions from the 23 wells, which would be considered a minor source unit permitted under a General Construction Permit per 20.2.72 NMAC for each proposed project.

3.2 Issue 2: How would the future potential development of the Proposed Action contribute to greenhouse gas (GHG) emissions?

The analysis areas associated with this issue are the state of New Mexico and the United States. These geographic scales are used in this analysis to provide multiple levels of context associated with GHG emissions as a result of the future potential oil and gas development of the Proposed Action. In addition, the effects of GHG emissions are global in nature.

3.2.1 Affected Environment

Climate change is a statistically significant and long-term change in climate patterns. The terms climate change and "global warming," though often used interchangeably, are not the same. Climate change is any deviation from the average climate via warming or cooling and can result from both natural and human (anthropogenic) sources. Natural contributors to climate change include fluctuations in solar radiation, volcanic eruptions, and plate tectonics. Global warming refers to the apparent warming of climate observed since the early twentieth century and is primarily attributed to human activities such as fossil fuel combustion, industrial processes, and land use changes.

The following information about GHGs, their relationship to climate change, and their effects on national and global climate is presented in the Air Resources Technical Report (BLM 2020f) and briefly summarized here. Findings indicate that warming of the climate system is unequivocal and many of the observed changes are unprecedented over decades to millennia. It is certain that the global mean surface temperature (GMST) has increased since the late nineteenth century and virtually certain that maximum and minimum temperatures over land have increased on a global scale since 1950. Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes. It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-twentieth century. Additional near-term warming is inevitable due to the thermal inertia of the oceans and ongoing GHG emissions, and the GMST is expected to continue rising over the twenty-first century under all projected scenarios. Climate change will impact regions differently and warming will not be equally distributed. Data indicate that in the region encompassing southern Colorado and New Mexico, average temperatures rose just under 0.7 degree Fahrenheit per decade between 1971 and 2011, which is approximately double the global rate of temperature increase. Climate modeling suggests that average temperatures in this region may rise by 4 to 6 degrees Fahrenheit by the end of the twenty-first century, with warming increasing from south to north. By 2080–2090, the southwestern United States will see a 10% to 20% decline in precipitation, primarily in winter and spring, with more precipitation falling as rain. A recent Bureau of Reclamation report made the following projections through the end of the twenty-first century for the Upper Rio Grande Basin (southern Colorado to south-central New Mexico) based on the current and predicted future warming:

- There will be decreases in overall water availability by one-quarter to one-third.
- The seasonality of stream and river flows will change with summertime flows decreasing.
- Stream and river flow variability will increase. The frequency, intensity, and duration of both droughts and floods will increase (BLM 2020f).

The natural greenhouse effect is critical to the discussion of climate change. The greenhouse effect refers to the process by which GHGs in the atmosphere absorb heat energy radiated by Earth's surface. Water vapor is the most abundant GHG, followed by CO_2, methane (CH_4), nitrous oxide (N_2O), and several other trace gases. These GHGs trap heat that would otherwise be radiated into space, causing Earth's atmosphere to warm and making temperatures suitable for life on Earth. Water vapor is often

excluded from the discussion of GHGs and climate change since its atmospheric concentration is largely dependent upon temperature rather than emissions by specific sources. The two primary GHGs associated with the oil and gas industry are CO_2 and CH_4. Because CH_4 has a global warming potential that is 21 to 28 times greater than the warming potential of CO_2, the EPA uses measures of CO_2 equivalent (CO_2e), which takes the difference in warming potential into account for reporting GHG emissions (BLM 2020f). Oil and gas field production activities do not substantially contribute to N_2O levels and are therefore not included in estimating potential direct emissions in this EA.

Table 3.6 shows 2016 annual estimated GHG emissions for the United States, New Mexico, and the major oil and gas basins of New Mexico. Emissions are expressed in metric tons of CO_2e. Table 3.7 shows historical annual estimated GHG emissions for the United States, New Mexico, and the production (downstream impacts) associated with major oil and gas basins of New Mexico. Emissions are expressed in metric tons of CO_2e.

Table 3.6. 2016 Estimated Annual GHG Emissions from Oil and Gas Field Production (Operations)

Annual GHG Emissions	CO_2e (metric tons/year)	U.S. Emissions (%)	New Mexico Oil and Gas Emissions (%)
Total U.S. GHG emissions from all sources	6,511,300,000	100	NA
Total U.S. GHG emissions from oil and gas field production	164,400,000	2.52	NA
Total New Mexico emissions from oil and gas field production	6,794,108	0.10	100.00
Total oil and gas emissions from federal production in New Mexico	3,955,124	0.06	58.21
Federal emissions in San Juan Basin from oil and gas field production (16,139 wells) *	1,678,942	0.03	24.71

* Includes federal mineral development in McKinley, Rio Arriba, Sandoval, and San Juan Counties (BLM 2020f).

Source: BLM (2020f).

Table 3.7. Historical Oil and Gas Production (Downstream/End Use)

Oil and Gas Production	2014	2015	2016	2017	2018
U.S. oil production (Mbbl)	3,196,889	3,442,188	3,232,025	3,413,376	4,011,521
New Mexico oil production (Mbbl)	125,021	147,663	146,389	171,440	248,958
PDO oil production (Mbbl)	62,007	73,344	74,810	76,307	122,032
BLM Mancos Gallup planning area oil production (Mbbl)	5,755	8,457	6,889	5,980	5,089
U.S. gas production (MMcf)	25,889,605	27,065,460	26,592,115	27,291,222	30,438,588
New Mexico gas production (MMcf)	1,140,626	1,151,493	1,139,826	1,196,514	*
BLM Mancos Gallup planning area gas production (MMcf)	245,550	281,713	287,347	293,094	476,405
FFO gas production (MMcf)	664,211	642,211	596,747	464,709	437,926
GHG Emissions					
Total U.S. oil and gas GHG emissions (MMT CO_2e)	2,791.29	2,961.11	2,844.84	2,961.08	-
Total New Mexico oil and gas GHG emissions (MMT CO_2e)	116.17	126.50	125.32	139.19	-
Total PDO oil and gas GHG emissions (MMT CO_2e)	40.10	46.95	47.89	48.85	-
Total BLM Mancos Gallup planning area oil and gas GHG emissions (MMT CO_2e)	38.82	38.78	35.62	28.00	-

Source: BLM (2020f).
Mbbl = thousand barrels of oil
MMcf = million cubic feet
MMT = million metric tons
PDO = Pecos District Office
*=Data total for PDO, FFO includes data from both federal and mixed exploratory land classes.
– = Data not available for 2018 (BLM 2020f).

3.2.2 Environmental Impacts- No Action

Under the No Action Alternative, the BLM would deny approval of the APDs and ROW grants. DJR would retain its lease rights, but the Proposed Action would not occur. Production in the area would continue at its current rate, and other current land use in the area would continue. No resulting impact to GHG emissions would occur.

3.2.3 Environmental Impacts- Proposed Action

3.2.3.1 METHODOLOGY AND ASSUMPTIONS

Oil and Natural Gas Development and Production Emissions Estimates

Well Development - Appendix J describes the phases associated with oil and gas development. As noted in the appendix, the construction phase includes development of the well pad, roads, and associated infrastructure such as reserve pits, pipelines, or fracturing ponds; and well drilling and completion, which may include flaring. Based on past experience within oil and gas development in New Mexico, the BLM has determined that construction of an oil well would result in 525.31 metric tons CO_2e and construction of a gas well would result in 1,021.59 metric tons CO_2e (BLM 2020f). The difference between the emissions associated with oil and gas wells is largely associated with the need for additional venting during well completion.

Field Production (Operations) - Emissions from operations include well workover operations (exhaust and fugitive dust), well site visits for inspection and repair, recompletion traffic, water and oil tank traffic, venting, compression and well pumps, dehydrators, and compression station fugitives. Based on past experience, the BLM has determined that the operation of an oil well in the FFO is estimated to result in 324.77 metric tons CO_2e; operation of a gas well would result in 93.98 metric tons CO_2e (BLM 2020f).

Oil and Gas Production (Downstream/End-Use) Emissions Estimates - Estimates of downstream/end-use GHG emissions are dependent on projected oil and gas production volumes. The BLM does not direct or regulate the end use of produced oil and/or gas. The challenge for estimating downstream emissions comes with understanding when and how oil and gas would be distributed and used for energy. However, it can be reasonably assumed that the oil and gas produced from the Proposed Action will be combusted for energy consumption and use. End uses of hydrocarbons extracted from the potential development of the Proposed Action could include the combustion of transportation fuels, fuel oils for heating and electricity generation, the production of asphalt and road oil, and the manufacturing of chemicals, plastics, and other synthetic materials. The BLM can only provide an estimate of potential GHG emissions using national approximations of where or how the end use may occur.

The BLM has used a method of calculating downstream GHG emissions based on estimated production data developed for the Proposed Action. GHG combustion emission factors, metric tons/bbl and metric tons/thousand cubic feet (mcf) for oil and gas, respectively, were applied to production volumes and converted to metric tons of CO_2 and CH_4. A global warming potential was then applied to CH_4, and

finally, a conversion to metric tons of CO_{2e} was made. GHG combustion emission factors for natural gas and petroleum were obtained from 40 CFR 98 (a) and (c). Global warming potentials align with the Intergovernmental Panel on Climate Change (IPCC) and EPA 100-year global warming potentials.

3.2.3.2 IMPACTS ANALYSIS

Potential effects from GHG emissions would occur from any oil and gas development of the Proposed Action. These GHG emissions would contribute to documented ongoing and reasonably foreseeable climate-related effects. As discussed in Section 3.2.1, these effects include the following: long-term global temperature change; intensified droughts impacting agricultural, rural, and urban communities and resulting in changes in land cover and land use; intensified and more frequent wildfires; sea level rise, ocean warming, and reduced ocean oxygen impacting global weather patterns, flora, and fauna; intensified flooding impacting infrastructure, natural resource–based livelihoods, and cultural resources; and human health, such as heat-associated deaths and illnesses, chronic diseases, and other health issues associated with poor air quality (Gonzalez et al. 2018).

GHG emissions from the potential future development of the Proposed Action include emissions from development of any potential wells detailed in the APDs, production associated with the wells, and downstream/end-use emissions from the consumption of oil and natural gas products.

Well Development and Field Production (Operations) - Table 3.8 presents annual GHG emissions associated with development and field production (operations) of the Proposed Action, assuming full development of the APDs (23 wells).

Table 3.8. Estimated Annual GHG Emissions from Development and Production of the Proposed Action

Annual GHG Emissions	CO_2e (metric tons)	All U.S. Annual Emissions (%)	Annual New Mexico Oil and Gas Production Emissions (%)
Well development (23 oil and natural gas wells, Year 1 only)	12,082	0.00019	0.012
Well field production (operations) (23 wells)	7,470	0.000012	0.007
Total	**19,552**	**0.00030**	**0.019**

Note: Totals calculated using an emissions factor of 525.31 metric tons CO_2e for construction and 324.77 metric tons CO_2e for operations to estimate emissions. Annual emissions from a gas well would be higher (based on 1,021.59 metric tons CO_2e from construction and 93.67 metric tons CO_2e from operation). However, over the 20-year life of a well, total emissions would be higher using oil wells to estimate emissions; therefore, for the sake of consistency and to most conservatively estimate impacts from GHG emissions, emissions from oil wells are used consistently throughout this analysis. Additionally, the historical emissions are estimated based on oil wells since oil wells are the predominant type of well in the FFO planning area, so this is a reasonable assumption.

Using the average annual oil and gas development emissions value of approximately 525.31 metric tons of CO_2e per oil well in the San Juan Basin of New Mexico (see *Well Development)* and multiplying by number of wells (23) yields an estimate of 12,082 metric tons CO_2e of annual GHG emissions from the Proposed Action, assumed to occur only in year 1. Using the average annual oil and gas production emissions value of approximately 324.77 metric tons of CO_2e per oil well in the San Juan Basin of New Mexico (see *Well Development)* and multiplying by number of wells (23) yields an estimate of 7,470 metric tons CO_2e of annual GHG emissions from the Proposed Action, assumed to occur for the life of the well. Together, well development and production emissions would result in 19,552 metric tons CO_2e in year 1, an increase of 0.00030% in the total annual U.S. GHG emissions and 0.019% of the total annual GHG emissions from oil and gas production in New Mexico (see Table 3.8). If well construction were to be spread out over multiple years, annual GHG emissions during those years would be lower than the total of 19,552 metric tons CO_2e that is reported in Table 3.8 but higher than the operations subtotal of

7,470 metric tons CO_2e. Over the life of the 23 oil wells, the total emissions from combined construction (during the first year) and operation over an assumed well lifespan of 20 years would be approximately 161,476 metric tons CO_2e.

Downstream/End Use (Indirect) - Potential downstream/end-use GHG emissions from full development of the NAU 2206 and BTWU 2308 cluster oil and natural gas wells are estimated using oil and gas production values. DJR estimates that each well will result in an average of 300 bbl of oil and 1,200 mcf of natural gas per day; the total average of oil and gas production for 23 wells will be 6,900 bbl of oil per day and 27,600 mcf of natural gas per day. Assuming a 20-year well life translates to 2,190,000 bbl of oil and 8,760,000 mcf of natural gas for one well or 50,370,000 bbl of oil and 201,480,000 mcf of natural gas for all 23wells. Table 3.9 shows estimated indirect GHG emission contributions for the Proposed Action using the EPA's GHG equivalencies calculator (EPA 2020h). As noted in Methodology and Assumptions section of this EA (Section 3.2.3.1), the BLM does not direct or regulate the end use of produced oil and/or gas.

Table 3.9. Estimated Downstream/End-Use (Indirect) GHG Emissions for the Proposed Action

Proposed Action Product	Emission Factors	Estimated Product Quantity	Estimated Emissions (metric tons CO_2e)
Crude Oil (bbl)	0.43 metric ton CO_2/bbl	50,370,000	21,659,100
Natural Gas (mcf)	0.055 metric ton CO_2/mcf	201,480,000	11,081,400
Total		**–**	**32,740,500**

Source: EPA (2020h)

3.2.4 Cumulative Impacts

The 2019 Air Resources Technical Report (incorporated by reference), Section 10.6, details recent trends of GHG emissions by sector. Within the fossil fuel combustion sector, the contribution by fuel type shows that petroleum represents 44.7% of the fuel type, natural gas 29.5%, and coal 25.8% (BLM 2020f).

In 2017, the BLM commissioned a climate change report with an energy focus. The report calculates GHG emissions associated with production and consumption activities related to coal, oil, natural gas, and natural gas liquids. The baseline year is 2014 and forecasts production/consumption GHG emissions for 2020 and 2030 for federal and non-federal land on a national level and for 13 energy-producing states, not limited to New Mexico, Oklahoma, Texas, and Kansas. Inputs for the report were developed using publicly available online information from such sources as the U.S. Energy Information Administration, EPA's *Greenhouse Gas Inventory Report: 1990–2014* (EPA 2016), U.S. Department of the Interior Office of Natural Resources Revenue, U.S. Extractive Industries Transparency Initiative, BLM oil and gas statistics, and others as applicable to each state. More information on the methodology and assumptions, as well as other data sources for all 13 states, is in the *Greenhouse Gas and Climate Change Report, 2017* (Golder Associates 2017), which is herein incorporated by reference.

In November of 2018, the U.S. Geological Survey (USGS) published a scientific investigation report, *Federal Lands Greenhouse Gas Emissions and Sequestration in the United States: Estimates 2005-2014* (Merrill et al. 2018). The 2019 Air Resources Technical Report summarizes this information and separates emissions by mineral and discloses relative percentages relative to national and worldwide GHG emissions. In 2014, end-use combustion and extraction of fossil fuels produced on New Mexico federal land was 91.63 million metric tons (MMT) CO_2e. This value is comparable with the 2014 baseline reported value of 93.72 MMT CO_2e as reported by Golder Associates (2017). The 2014 baseline for the 13 states evaluated in the Golder Associates report is 1,275.53 MMT CO_2e, compared with an estimated

1,332 MMT CO_2e in the USGS report (Merrill et al. 2018). The values from USGS and Golder Associates include emissions from the combustion of coal, oil, and natural gas from fossil fuels produced on federal land, as well as extraction emissions from activities occurring on federal land.

For the purposes of this analysis, BLM uses projections of the total federal and non-federal oil and gas emissions from Golder Associates (2017) to estimate expected annual future GHG emissions from energy production and consumption activity within a subnational region, including New Mexico, Oklahoma, Kansas, and Texas, over which the BLM New Mexico State Office (NMSO) has jurisdiction. Assumptions of the analysis are discussed in Golder Associates (2017). The following are key assumptions:

- State-specific oil consumption is equal to state total production minus export and reserves for the state based on national averages.
- National averages for sector breakdown percentages (power, industrial, etc.) for oil, natural gas, and natural gas liquids consumptions were applied to state-specific data.
- The value of production and consumption on non-federal land is equal to the difference of the total state or national value minus the federal land value.

At the state level, production does not necessarily translate to 100% consumption of the fossil fuel but is representative of future energy consumption and production to show GHG emissions. The development projected in the RFDs for each BLM field office under NMSO jurisdiction (such as the 2016 RFD for the Pecos District Office [PDO]; see Engler and Cather 2012, 2014) are considered in these data. Current and future lease sales are part of each RFD. Because the BLM NMSO has control over lease sales in this area, for NEPA disclosure purposes, this section provides a discussion of reasonably foreseeable cumulative production and consumption within these states and discloses the magnitude of GHG emissions likely to result from BLM NMSO lease sale activities on an annual basis. This information is further contextualized by comparing the relative magnitude of these emission with projected national and global annual GHG emission rates.

New Mexico Coal, Oil, and Gas GHG Emissions

BLM's New Mexico reasonably foreseeable coal, oil, and gas production and consumption GHG emissions from federal activities are 95.09 MMT CO_2e for the 2020 high scenario and 99.35 MMT CO_2e for the 2030 high scenario (Table 3.10). These represent increases of 2.5% and 7.2%, respectively, from the 2014 baseline coal, oil, and gas GHG emissions (92.75 MMT CO_2e). New Mexico federal coal, oil, and gas GHG emissions of 95.09 (2020 high scenario) and 99.35 (2030 high scenario) MMT CO_2e/year would represent 49% and 52% of state 2020 and 2030 high reasonably foreseeable coal, oil, and gas GHG emissions (Table 3.10).

Table 3.10. Reasonably Foreseeable Coal, Oil, and Gas Production and Consumption GHG Emissions, BLM New Mexico, Oklahoma, Kansas, and Texas

	GHG Emissions (MMT CO_2e per year)				
Category	**New Mexico**	**Oklahoma**	**Kansas**	**Texas**	**NM, OK, KS, TX**
2020 High Scenario					
Federal coal	13.89	1.25	0	0	15.14
Federal oil	25.49	0.33	0.08	0.06	25.95
Federal gas	49.60	0.96	0.29	2.40	53.25
Federal natural gas liquids	6.11	0.09	0.05	0.04	6.29

GHG Emissions (MMT CO_2e per year)					
Category	**New Mexico**	**Oklahoma**	**Kansas**	**Texas**	**NM, OK, KS, TX**
Total Federal	**95.09**	**2.63**	**0.42**	**2.50**	**100.64**
Federal + non-federal coal	43.12	1.87	0.13	97.46	142.58
Federal + non-federal oil	55.28	56.72	22.10	518.06	652.16
Federal + non-federal gas	83.28	152.16	18.14	694.29	947.87
Federal + non-federal natural gas liquids	12.14	20.09	3.14	84.14	119.51
Total federal and non-federal	**193.82**	**230.84**	**43.51**	**1,393.95**	**1,862.12**
2030 High Scenario					
Federal coal	10.14	0.91	0	0	11.05
Federal oil	25.60	0.33	0.08	0.06	26.07
Federal gas	57.44	1.11	0.34	2.78	61.67
Federal natural gas liquids	6.17	0.09	0.05	0.04	6.35
Total Federal	**99.35**	**2.44**	**0.47**	**2.88**	**105.14**
Federal + non-federal coal	31.52	1.37	0.1	71.12	104.11
Federal + non-federal oil	55.51	56.95	22.19	520.20	654.85
Federal + non-federal gas	96.45	176.21	21.02	804.05	1,097.72
Federal + non-federal natural gas liquids	12.25	20.27	3.17	84.88	120.57
Total federal and non-federal	**195.73**	**254.8**	**46.47**	**1,480.25**	**1,977.25**

Note: Totals may not sum exactly due to rounding.

Source: Golder Associates (2017).

Oklahoma Coal, Oil, and Gas GHG Emissions

BLM's Oklahoma reasonably foreseeable coal, oil, and gas production and consumption GHG emissions from federal activities are 2.63 MMT CO_2e for the 2020 high scenario and 2.44 MMT CO_2e for the 2030 high scenario (see Table 3.10). This is a decrease of 1.9% and an increase of 8.9%, respectively, from the 2014 baseline coal, oil, and gas GHG emissions (2.68 MMT CO_2e). Oklahoma federal coal, oil, and gas GHG emissions of 2.63 MMT (2020 high scenario) and 2.44 (2030 high scenario) MMT CO_2e/year would represent 1.14% and 0.96%, respectively, of state 2020 and 2030 high reasonably foreseeable GHG emissions from coal, oil, and gas activities (see Table 3.10).

Kansas Coal, Oil, and Gas GHG Emissions

BLM's Kansas reasonably foreseeable coal, oil, and gas production and consumption GHG emissions from federal activities are 0.42 MMT CO_2e for the 2020 high scenario and 0.47 MMT CO_2e for the 2030 high scenario (see Table 3.10). These values represent increases of 5.0% and 17.5%, respectively, compared with the 2014 baseline coal, oil, and gas GHG emissions (0.40 MMT CO_2e). Kansas federal coal, oil, and gas GHG emissions of 0.42 (2020 high scenario) and 0.47 (2030 high scenario) MMT CO_2e/year would represent 0.97% and 1.01%, respectively, of state 2020 and 2030 high reasonably foreseeable GHG emissions from coal, oil, and gas activities (see Table 3.10).

Texas Coal, Oil, and Gas GHG Emissions

BLM's Texas reasonably foreseeable coal, oil, and gas production and consumption GHG emissions from federal activities are 2.50 MMT CO_2e for the 2020 high scenario and 2.88 MMT CO_2e for the 2030 high scenario (see Table 3.10). These are increases of 4.2% and 20.7%, respectively, compared with the 2014 baseline coal, oil, and gas GHG emissions (2.40 MMT CO_2e). Texas federal coal, oil, and gas GHG emissions of 2.50 (2020 high scenario) and 2.88 (2030 high scenario) MMT CO_2e/year would represent 0.18% and 0.19%, respectively, of state 2020 and 2030 high reasonably foreseeable GHG emissions from coal, oil, and gas activities (see Table 3.10).

Although a NEPA document may present quantified estimates of potential GHG emissions associated with reasonably foreseeable energy development, there is uncertainty with regard to eventual production volumes and variability, flaring, construction, transportation, etc. A rough estimate was possible using publicly available information and estimates from future production for RFD. Also, there is uncertainty with regard to the net effects of reasonably foreseeable energy development on climate; that is, while BLM actions may contribute to the climate change phenomenon, the specific effects of those actions on global climate are speculative given the current state of the science. Inconsistencies in the results of scientific models designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts of decisions made at this level and to determine the significance of any discrete amount of GHG emissions beyond the limits of existing science.

Cumulative Climate Change Impacts

Changes in climate are generally measured over long time periods to avoid the influence of meteorological or climatic cycles occurring on shorter time scales (e.g., inter-annual variability). While climate change projections are available for different regions, the climate impacts from GHGs are a global issue.

Golder Associates (2017:Section 4.0) discusses future climate projections, including four representative concentration pathways (RCPs) as identified by the IPCC: RCP 2.6, 4.5, 6.0, and 8.5. The RCP scenarios were developed based on representative GHG emission scenarios including varying assumptions regarding levels of cumulative global GHG emissions over time. RCP 8.5 assumes increasing GHG emissions over time, with no stabilization, and is meant to be representative of scenarios leading to high GHG concentration levels. RCP 4.5 and RCP 6.0 represent scenarios for which GHG emissions are reduced over time through climate policy. RCP 2.6 represents a scenario for which drastic action is taken through stringent climate policy and substantial GHG emission reductions are achieved over time. The pathways are named after the radiative forcing (defined as the difference between insolation [sunlight] absorbed by the Earth and energy radiated back to space) projected to occur by 2100 (e.g., RCP 8.5 would be projected to result in 8.5 W/m^2 radiative forcing by 2100). The radiative forcing of the atmosphere in each pathway is driven by the concentration of GHGs accumulated in the atmosphere. The RCP characterizations and regions are further described by Golder Associates (2017:Section 4.1).

Climate change is driven by radiative forcing, which is influenced by cumulative GHG emissions, not annual emission rates from any given subnational project. Figure 3.1 shows a comparison of global cumulative emissions in relation to RCPs 2.6, 4.5, and 8.5, representing low, medium, and high global cumulative emissions scenarios.

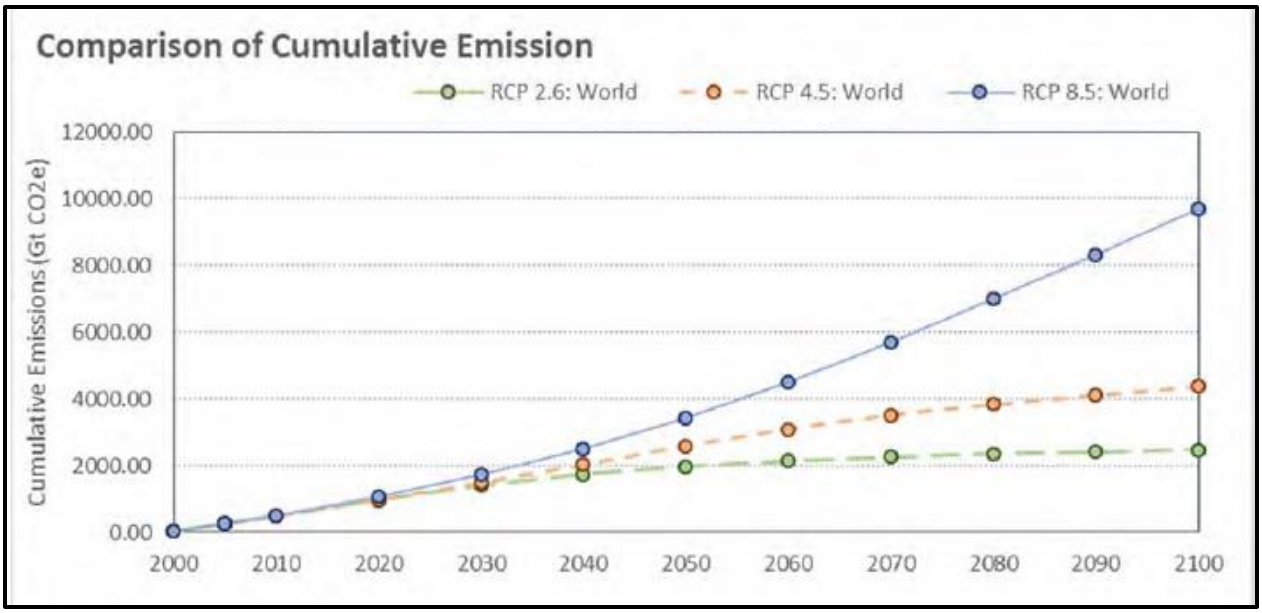

Figure 3.1. Comparison of RCP 2.6, RCP 4.5, and RCP 8.5 cumulative emission estimates over the twenty-first century.

When considering the cumulative emissions on a global scale, the annual emission rates of various subnational projects are one of many emission contributions. Any single contribution on a subnational scale is dwarfed by the large number of comparable national and subnational contributors on a global scale. However, the best surrogate for understanding the potential impact of the BLM's subnational scale emissions on climate is estimating projected annual emission rate due to BLM energy lease sale projects. Golder Associates (2017) provides projections of GHG emissions from the 13 western states that regulate most of the federal fossil fuel leasing and compares these emissions with GHG emissions from other contributors. To accomplish this comparison, Golder Associates (2017) demonstrates a comparison of the projected BLM annual emission rates derived from federal lease sale and production information from the 13 western states and compares them with the RCP scenario emissions profile (a derived value estimating the annual GHG emission rate for each scenario). This comparison is provided in Figure 3.2.
For additional context, 2014 baseline year federal resource production and consumption estimates for these 13 states can be compared with the 2014 baseline national energy consumption and total GHG emissions. BLM subnational emissions in these 13 states are approximately 25.97% of the total national energy consumption emissions and 19.75% of national GHG emission totals at 2014 levels. In 2014, federal mineral production and consumption emissions in these 13 states represented approximately 2.64% of the global totals from all emission sources. With the relative magnitude of these emissions in mind, climate change trends and impacts are discussed below.

The contribution of GHG emissions from coal, oil, natural gas, and liquefied natural gas for the 13 BLM subject states in 2020 and 2030 under both normal and high production scenarios were evaluated and compared with the GHG emissions profile (the derived annual emission rate for the three RCP scenarios shown in Figure 3.2). By comparing the relative emission rates of the derived ranges of BLM emissions profiles (low and high estimates) with the RCP scenarios, the BLM emissions most closely track with RCP 8.5 in 2020 and between RCP 2.6 and RCP 4.5 in 2030 (Golder Associates 2017). The reduction in BLM's emissions profile in 2030 compared with 2020 is a result of a projected change to the federal energy resource mixture. Less coal development is projected, while a slight increase in oil, gas, and natural gas liquids are projected into 2030 relative to 2020. Because coal is the most GHG-intensive fossil

fuel, the reduction in this resource development is anticipated to reduce BLM's lease sale emissions profile (annual GHG emission rate) overall (see Figure 3.2).

Based on the analysis in Golder Associates (2017), BLM activities are estimated to be conducted at a level that would be in line with the level of emissions anticipated in RCP 2.6 and RCP 4.5 through 2060. Estimates of BLM activities in future years are more uncertain and have a wider range of variability. The projections presented above are based on best available data and assumptions used to provide context to BLM's cumulative impact. However, due to the levels of uncertainty, some additional information is provided below regarding BLM's relative contribution to global emissions and, by proxy, climate change. If the BLM operates under the business-as-usual scenario while all other contributors are reducing their emissions in line with RCP 2.6, the relative contribution of BLM increases as the emissions more closely resemble RCP 4.5. If the BLM operates under the decreased emissions scenario, keeping their reductions in line with RCP 2.6 like all the other contributors, the relative contribution of BLM remains similar to current contributions. If BLM operates under the decreased emissions scenario while all other contributors are maintaining constant emissions (business-as-usual) or increasing emissions, the relative contribution of BLM greatly reduces. It is very unlikely that the global cumulative emissions will be strongly influenced by a single contributor at a national or subnational scale. However, the individual behavior of each contributor, through its relative contribution, has the ability to influence which RCP global emissions scenario is most closely resembled and, therefore, which climate change projections are most likely manifested toward the end of the century (Golder Associates 2017).

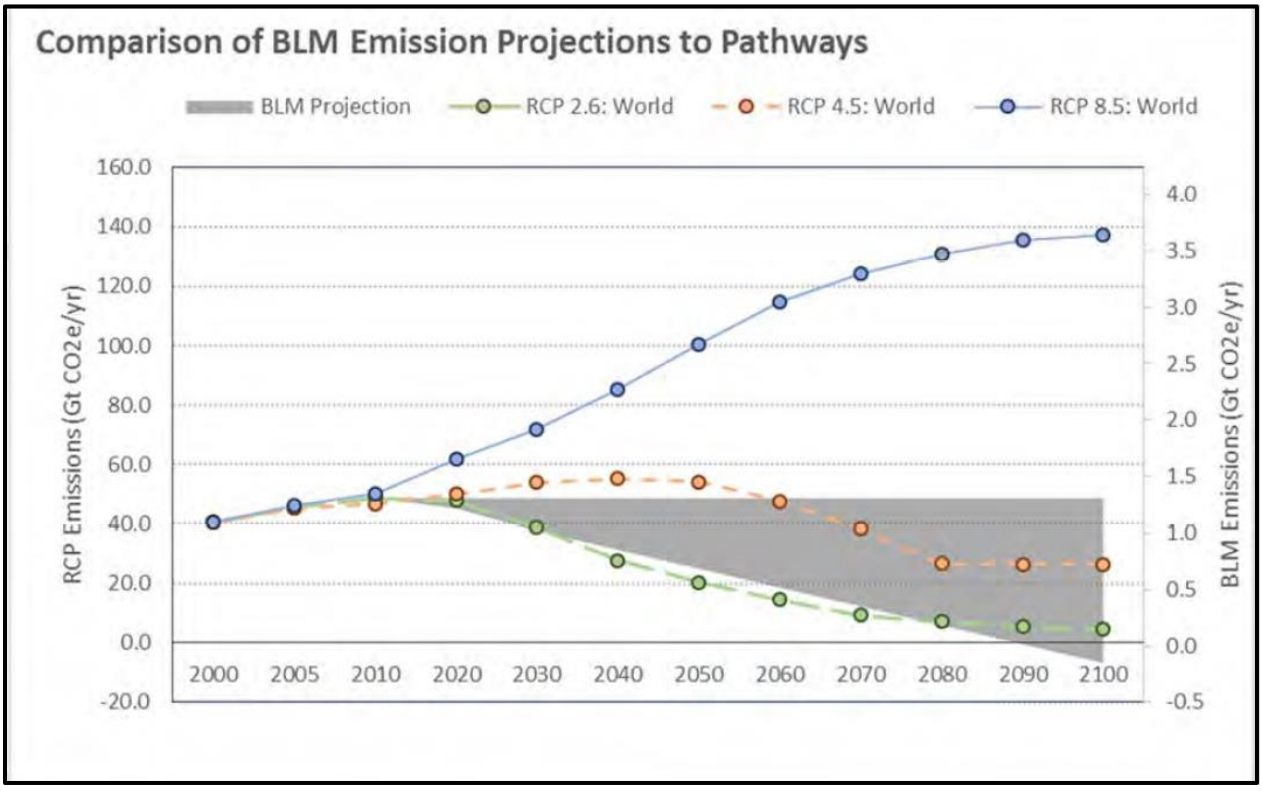

Figure 3.2. Comparison of BLM emission projections with RCP 2.6, RCP 4.5, and RCP 8.5.

To understand the impacts of climate change, three RCP scenario projections of global temperature and precipitation changes in both the near term (representing the period from 2021 through 2040) and far term (representing the period from 2081 through 2100) are presented in Table 3.11. These estimates are

derived from the average of over 30 different climate change models using the inputs of each RCP scenario.

Table 3.11. Projected Changes in Climate under Representative Concentration Pathways

RCP Pathway	Near Term		Far Term	
	Temperature (°C)	Precipitation (%)	Temperature (°C)	Precipitation (%)
RCP 2.6	0.78	1.44	0.97	2.27
RCP 4.5	0.85	1.49	1.81	3.51
RCP 8.5	0.98	1.62	3.68	5.89

Under each RCP scenario, projected average global temperatures are expected to increase and changes in precipitation are anticipated. However, generally, the impacts of climate change are least severe under the RCP 2.6 scenario and most severe under the RCP 8.5 scenario. Regardless of the specific magnitude of the impacts, the impacts on global climate are anticipated to include

- long-term global temperature change;
- intensified droughts impacting agricultural, rural, and urban communities and resulting in changes in land cover and land use;
- intensified and more frequent wildfires;
- sea level rise, ocean warming, and reduced ocean oxygen, impacting global weather patterns and flora and fauna;
- intensified flooding impacting infrastructure, natural resource–based livelihoods, and cultural resources; and
- human health, such as heat-associated deaths and illnesses, chronic diseases, and other health issues associated with poor air quality (Gonzalez et al. 2018).

To understand climate change impacts in the analysis area of the Proposed Action, impacts anticipated in the region encompassing southern Colorado and New Mexico are discussed. Climate modeling suggests that annual average temperatures in this region may rise by 4 to 6 degrees Fahrenheit by the end of the twenty-first century, with warming increasing from south to north. By 2080–2090, the southwestern United States would see a 10% to 20% decline in precipitation, primarily in winter and spring, with more precipitation falling as rain. A recent Bureau of Reclamation report (2013, as cited in BLM 2020f) made the following projections through the end of the twenty-first century for the Upper Rio Grande Basin (southern Colorado to central-southern New Mexico) based on the current and predicted future warming:

- There would be decreases in overall water availability by one-quarter to one-third.
- The seasonality of stream and river flows would change, with summertime flows decreasing.
- Stream and river flow variability would increase. The frequency, intensity, and duration of both droughts and floods would increase (BLM 2020f).

The Bureau of Reclamation report also noted that reduction in water is expected to make environmental flows in the Upper Rio Grande system more difficult to maintain and reduce the shallow groundwater available to riparian vegetation. Both of these impacts have implications for the habitat of fish and wildlife in the Upper Rio Grande Basin riparian ecosystems (Bureau of Reclamation et al. 2013).
A U.S. Forest Service assessment of 117 species of birds, reptiles, amphibians, and mammals along the

Middle Rio Grande in New Mexico (Friggens et al. 2013, as cited in Bureau of Reclamation et al. 2013) projected decreasing availability of riparian habitat and loss of mature trees due to fire and disease that would directly and indirectly affect many species of birds and mammals. Most evaluated species were projected to experience negative effects from climate change; however, a few species, such as coyotes, jackrabbits, some lizards, and roadrunners, may benefit from conversion of the bosque to a more sparsely vegetated and drier habitat (Friggens et al. 2013, as cited in Bureau of Reclamation et al. 2013).

3.2.5 Mitigation and Residual Effects

The BLM BMPs are designed to reduce impacts on air quality (see Issue 1) and reduce CH_4 and GHGs. In addition, the BLM encourages industry to participate in the Natural Gas STAR program that is administered by the EPA. The Natural Gas STAR program is a flexible, voluntary partnership that encourages oil and natural gas companies to adopt proven, cost-effective technologies and practices that improve operational efficiency and reduce natural gas emissions (EPA 2006). Adoption of the Natural Gas STAR program would likely significantly reduce CO_2e emissions since the program is particularly focused on reducing CH_4, which has a high global warming potential. However, adoption of Natural Gas STAR Program best practices would reduce but not eliminate GHG emissions.

The EPA has New Source Performance Standards (NSPS) (codified in 40 CFR 60) in place to reduce CH_4 emissions from oil and gas sources. NSPS OOOOa requires reduction of VOCs and CH_4 from well completion operations from new or re-fractured hydraulically fractured wells and a requires reduction of storage tank emissions by 95% for tanks constructed after September 18, 2015, with emissions greater than 6 tons per year of VOC (this has the co-benefit of reducing CH_4 emissions as well). NSPS OOOOa also imposes stringent semiannual leak detection and repair requirements for the collection of fugitive emission components at well sites constructed after September 18, 2015. NSPS OOOOa also requires scheduled maintenance and/or emission control devices for reciprocating and centrifugal compressor venting at compressor stations and includes provisions to limit emissions from natural gas pneumatic devices and pumps. These provisions aim to reduce fugitive emissions of CH_4 at oil and gas facilities. The NMED and New Mexico Energy, Minerals and Natural Resources Department (EMNRD) are each in the process of developing rules that will regulate CH_4 emissions. The departments were charged with this task under the Executive Order on Addressing Climate Change and Energy Waste Prevention of Gov. Michelle Lujan Grisham. The order instructs NMED and EMNRD to "jointly develop a statewide, enforceable regulatory framework to secure reductions in oil and gas sector methane emissions and to prevent waste from new and existing sources and enact such rules as soon as practicable" (NMED 2019).

3.3 Issue 3: How would future drilling and completion operations associated with the Proposed Action impact groundwater quality and quantity?

3.3.1 Affected Environment

The following analysis summarizes information contained in the *2019 and 2020 BLM New Mexico Water Support Document(s)*, hereafter referred to as the Water Support Document (BLM 2019, 2020h). The analysis area established to analyze impacts on water quality and quantity is the New Mexico portion of the San Juan Basin (which encompasses San Juan, McKinley, Rio Arriba, and Sandoval Counties), where water use associated with oil and gas development is most likely to occur and which represents the highest potential for oil and gas development in the BLM FFO region. The 2018 RFD scenario states that "unless significant new oil and gas discoveries are made in the area, future activity will be primarily horizontal drilling for oil in the Mancos-Gallup play, with minor development targeted at natural gas production" (Crocker and Glover 2018:2).

3.3.1.1 CURRENT TOTAL WATER USE IN THE ANALYSIS AREA

The 2018 USGS report, Estimated Use of Water in the United States in 2015 (Dieter et al. 2018), lists total water withdrawals across eight water use categories: aquaculture, domestic, industrial, irrigation, livestock, mining, public water supply, and thermoelectric power. Within the New Mexico portion of the San Juan Basin, total water use in 2015 was estimated at 486,660 acre-feet (AF) (15% of total state withdrawals). About 10% of this total (or 50,008 AF) came from groundwater. The largest water use categories in the New Mexico portion of the San Juan Basin are irrigation (79%), followed by public water supply (8%); and 2% (11,658 AF per year) of 2015 total water use in the New Mexico portion of the San Juan Basin is attributable to mining (the category under which oil and gas operations are reported), all of which comes from groundwater sources (BLM 2019; Dieter et al. 2018). Updated water use data, which include 2019 FracFocus data, are included in the 2020 Water Support Document and described in more detail below.

Water Use for Oil and Gas Development

As part of oil and gas development, water is used for drilling fluid preparation and make-up water for completion fluids, in well stimulation (of which the most common method is hydraulic fracturing), as rig wash water, as coolant for internal combustion engines, for dust suppression on roads or well/facility pads, and for equipment testing. Water use associated with hydraulic fracturing of wells, which comprises the majority of water use, is dependent on many factors, including the target geologic formation and design of the hydraulic fracturing job. On average, the water use associated with hydraulic fracturing for vertical wells in the New Mexico portion of the San Juan Basin is 0.537 AF per well (Crocker and Glover 2018). Horizontal wells require more water than vertical wells for well completion. The 2018 RFD (Crocker and Glover 2018) reported that horizontal wells in the New Mexico portion of the San Juan Basin require on average approximately 3.13 AF of water. However, recent studies using 2014–2019 data from FracFocus (a national hydraulic fracturing chemical registry managed by the Ground Water Protection Council and Interstate Oil and Gas Compact Commission) show that water use for hydraulic fracturing of oil and gas wells in the New Mexico portion of the San Juan Basin has varied over the last 6 years but decreased from 658 AF in 2018 to 161 AF in 2019 (FracFocus 2020). Analysis of 2019 FracFocus data for the New Mexico portion of the San Juan Basin showed a decrease in the 6-year average with the revised water use estimates; however, the BLM considers 4.74 AF per horizontal well to be the most accurate estimate of current water use for hydraulic fracturing of a horizontal well in the New Mexico portion of the San Juan Basin. The decrease in water use in 2019 is due to the decrease in new well completions and the increase in recompletions or restimulation of old wells in the San Juan Basin. The 2019 water use average was approximately 1.9 AF per well (BLM 2020h). The 2019 average includes recompletions (which requires about 0.25 AF), nitrogen completions and one slick water completion. The average water use for nitrogen completion in 2019 was 5.6 AF. Over the last 6 years (2014–2019), approximately 85% of the completed wells within the San Juan Basin have used nitrogen stimulation (BLM 2020h). Nitrogen stimulation is a common technique in which gaseous nitrogen is used in place of water to achieve the same oil and gas yield. Beginning in 2015, the BLM FFO began receiving APDs that included new technologies that utilize greater quantities of water during the stimulation of the well under development, such as slick water stimulation. To date, 20 wells have been drilled using long laterals with slick water stimulation within the BLM FFO region. Based on water use information for these wells obtained from FracFocus and lateral length information obtained from the well APDs, the BLM has calculated a water use average of 27 AF per lateral mile. Additional information on estimated water use for slick water stimulation is contained in the Water Support Document (BLM 2020h).

Water Sources and Water Quality

The geologic setting of the San Juan Basin is highly stratified and complex. There are 10 major confined aquifers in the San Juan Basin: Morrison Formation, Ojo Alamo Sandstone, Pictured Cliffs Sandstone,

Cliff House Sandstone, Menefee Formation, Kirtland Shale/Fruitland Formation, Point Lookout Sandstone, Gallup Sandstone, Dakota Sandstone, and Entrada Sandstone. Water yields in these formations vary, with Cenozoic (younger) aquifers in the San Juan Basin (such as the Ojo Alamo Sandstone, the Nacimiento Formation, and the San Juan Formation) having potential to produce water at a rate of 100 gallons per minute; however, in general, most aquifers yield less than 20 gallons per minute (BLM 2020h:35, 36). In the southern portion of the San Juan Basin, water for hydraulic fracturing of oil wells comes from sources that tap the Nacimiento Formation and the Ojo Alamo Sandstone.

Groundwater quality in the San Juan Basin is variable (ranging from fresh to brackish) due to the complex stratigraphy and varying rock formations within the Basin. Brackish and saline water is typically found in the center of the Basin, and fresh groundwater is typically found along the Basin margins. Total dissolved solids (TDS) concentration is the primary indicator of groundwater quality. Higher TDS concentrations typically make water less suitable for drinking or for agricultural purposes like irrigation. In groundwater, TDS is influenced by the dissolution of natural materials such as rock, soil, and organic material. Anthropogenic activities also contribute to TDS concentrations in shallow, unconfined aquifers. TDS concentration in the San Juan Basin is dependent on the stratigraphic location and the geologic formation where the water resides. Fresh water (TDS less than 1,000 milligrams per liter [mg/L]) is typically found at depths below 2,500 feet below the ground surface, although exceptions to this generalization occur in deeper layers like the Gallup Sandstone and Morrison Formation. Saline and brackish water is dominant in the center of the basin at deeper depths (BLM 2020h:39). The Entrada Sandstone Formation is an aquifer with TDS greater than 10,000 parts per million (ppm) (BLM 2020h:38).

San Juan Basin oil and gas operators have recently included plans to use multiple hydraulic fracturing methods including slick water fracturing technology. The higher allowable TDS levels that are acceptable for slick water stimulation expand the possible water sources beyond those that are traditionally used (e.g., surface water or groundwater) into non-traditional sources of water (e.g., non-potable groundwater sources). These include non-potable connate water (groundwater) from the Entrada Sandstone Formation, as well as “flowback fluid” and “produced water.” Flowback fluid is a mixture of chemical proppant, water, and sand that flows back through the wellhead directly after stimulation activities. Produced water is naturally occurring water that exists in the formation that is being targeted for mineral extraction and is produced as a byproduct. The Water Support Document (BLM 2020h) contains additional information regarding potential water sources that may be used.

3.3.1.2 WATER DISPOSAL

Historically, more than 95% of the produced water associated with oil and gas operations has been injected into saltwater disposal wells (BLM 2015). The New Mexico Oil Conservation Division (NMOCD) regulates and monitors underground injection wells. NMOCD permits saltwater disposal wells into formations that will allow water infiltration and has TDS greater than 10,000 mg/L. The majority of current saltwater disposal wells are permitted in the Entrada Formation; however, some older saltwater disposal wells were permitted in the Mesaverde Formation. Using data from the New Mexico State Land Office, over 600 saltwater disposal wells are currently located throughout the San Juan Basin with an average depth of around 6,000 feet (BLM 2018d).

3.3.1.3 SPILLS

As noted in the Water Support Document, there have been 159 spills in the New Mexico portion of the San Juan Basin. Roughly half of all spills are not recovered but are remediated, which may include removal of contaminated soil (BLM 2020h:40).

3.3.2 Environmental Impacts – No Action Alternative

Under the No Action Alternative, the BLM would deny approval of the APDs and ROW grants. DJR would retain its lease rights, but the Proposed Action would not occur. Production in the area would continue at its current rate, and other current land use in the area would continue. No resulting impact to water quality would occur.

3.3.3 Environmental Impacts – Proposed Action

3.3.3.1 WATER QUANTITY

Under the Proposed Action, based on the depth of the Gallup Sandstone Formation (4,500 feet) and other similar DJR projects, as well as data found in the current APDs, it is projected that development of each well associated with the Proposed Action would require 50,000 bbl of water, or 6.44 AF, for drilling and completion. Of this total, approximately 5,000 bbl (0.64 AF) of water would be used for drilling/dust/construction purposes and 45,000 bbl (5.8 AF) would be used for completion (DJR 2020b). Development of all 23 NAU 2208 and BTWU 2308 cluster oil and natural gas wells would require a total of approximately 148.12 AF. Drilling and development of each well is estimated to take place over a 20-day period. DJR would use nitrogen gas fracturing technology for well completion. This is a relatively low water use completion technology (BLM 2020h). All fresh water used for pad, road construction, and well drilling and completion would be taken from DJR's NAU WSW No.7, point of diversion authorization number SJ-4348; and/or the Blanco Trading Post Water Well, point of diversion authorization number SJ-2105.

Assuming all 23 wells were developed in the same year, estimated water use would comprise less than 0.03% of the 2015 San Juan Basin total water use and 0.3% of 2015 San Juan Basin total groundwater use and would result in a 0.09% increase over 2015 water use in the mining category for the San Juan Basin (see Section 3.3.1.1). The total estimated water use for drilling and completion of 23 wells (148.12 AF) in a single year represents approximately 92% of the 2019 San Juan Basin oil and gas water use reported to FracFocus (161AF). However, DJR will not likely develop these wells concurrently; the estimated water use for drilling and completion of one well (6.44 AF) in one year is approximately 4% of the 2019 San Juan Basin oil and gas water use reported to FracFocus (161 AF). As such, the percent contribution to annual water use would be lower if well development is spread out over a period of years.

3.3.3.2 WATER QUALITY

DJR would use nitrogen gas fracturing technology for well completion. Hydraulic fracturing is intended to change the physical properties of producing formations by increasing the flow of water, gas, and/or oil around the wellbore, resulting from the introduction of water, proppant (sand), and chemical additives into the producing formations. Types of chemical additives used in completion activities could include acids, hydrocarbons, thickening agents, gelling agents, lubricants, and other additives that are operator- and location-specific. The largest components in hydraulic fracturing fluid are water and sand.

The wells would most likely pass through usable groundwater aquifers currently or potentially supplying stock, residential, and/or irrigation water. Potential impacts on groundwater resources could occur if proper cementing and casing programs are not followed. This could include loss of well integrity, surface spills, or loss of fluids in the drilling and completion process, with the introduction of chemical additives to be used in drilling and completion activities to be introduced into usable water (TDS >10,000 ppm) zones. If contamination of aquifers from any source occurs, changes in groundwater quality could impact springs and water wells that are sourced from the affected aquifers. The Water Support Document contains a detailed summary of the regulatory program associated with hydraulic fracturing and measures to protect groundwater quality. Since the advent of hydraulic fracturing, more than 1 million hydraulic

fracturing treatments have been conducted, with one potential documented case of direct groundwater pollution resulting from injection of hydraulic fracturing chemicals used for shale gas extraction (Gallegos and Varela 2015). There have not been any documented past instances of groundwater contamination in the analysis area attributed to well drilling (BLM 2020h). Due to DJR's adherence to NMOCD's casing, cementing, and pressure-testing requirements to prevent contamination of aquifers, it is anticipated that the proposed wells would not impact water quality.

With consideration of design features, development of the Proposed Action is not expected to affect water quality. Should a spill occur, the BLM would work with the NMOCD to immediately remediate spills on BLM land in accordance with federal and state standards, including 19.15.29.11 NMAC. See the Water Support Document (BLM 2020h) for more information on spills. Storage of the oil and liquids at the proposed project areas would increase potential for oil or produced water spills that could affect groundwater quality. See Section 2.1.7 for a list of production equipment; details of each project, including design features and BMPs associated with production equipment containment, can be found in the APDs and SUPOs on file with the BLM FFO.

3.3.4 Cumulative Impacts

3.3.4.1 CUMULATIVE IMPACT AREA

The analysis area established to measure cumulative impacts on water quality and quantity is the San Juan Basin (which encompasses San Juan, McKinley, Rio Arriba, and Sandoval Counties), where water use associated with oil and gas development is most likely to occur because the San Juan Basin presents the highest potential for oil and gas development in the BLM FFO area.

3.3.4.2 PAST AND PRESENT ACTIONS

Past and present water use is summarized in Section 3.3.1, Affected Environment. As noted, total water use in the counties of New Mexico comprising the San Juan Basin is 486,660 AF; mining (which includes oil and gas development) comprised about 2% of 2015 San Juan Basin water withdrawals. The largest water use category within the analysis area is agricultural irrigation, comprising 79% of all water use within the San Juan Basin.

3.3.4.3 REASONABLY FORESEEABLE FUTURE ACTIONS

Estimates for the number of oil and gas wells that could reasonably occur in the New Mexico portion of the San Juan Basin were derived from the 2018 RFD scenario, which projects 3,200 total wells (2,300 horizontal wells, 900 vertical wells) to be drilled in the New Mexico portion of the San Juan Basin between 2018 and 2037 (Crocker and Glover 2018). The BLM developed four scenarios of cumulative water use from development of the 2,300-horizontal well RFD and are briefly described below.

1. Based on vertical and horizontal water use estimates contained in the 2018 RFD scenario, water use would require 11,615 AF total or about 580 AF in any given year. Annual water use from development would comprise about 1.3% of San Juan Basin 2015 total water withdrawals (486,660 AF). Development of the 2018 RFD would also require some water for drilling, dust control, and construction of reasonably foreseeable transmission lines and pipelines (BLM 2019).

2. Based on vertical and horizontal water use estimates, assuming all 2,300 horizontal wells would use nitrogen stimulation for completion, estimated water use for this scenario would require 4,853 AF or approximately 243 AF in any given year. This would comprise about 0.009% of San Juan Basin 2015 total water withdrawals (486,660 AF) (BLM 2019, 2020h).

3. Based on vertical and horizontal water use estimates, assuming all 2,300 horizontal wells use slick water completion, estimated water use for this scenario would require 125,000 AF or approximately 6,250 AF in any given year. This would comprise 26% of San Juan Basin total water withdrawals (486,660 AF) (BLM 2019, 2020h).

4. Based on vertical and horizontal water use estimates, assuming a 3% annual slick water increase scenario predicts a consistent 3% increase in the proportion of slick water wells and a corresponding decrease in water and nitrogen stimulated wells. This scenario assumes an average water use of 1.9, 2.7, and 41.3 AF/well for nitrogen, water, and slick water wells, respectively. This scenario would require 29,098 AF or 1,455 in any given year. This would comprise 60% of San Juan Basin total water withdrawals (486,660 AF) (BLM 2019, 2020h).

Future well development, such as the NAU 2208 and BTWU 2308 cluster oil wells (described in Sections 1.1 and 2.1) that would be supported by the Proposed Action, is already considered in these scenarios. More details about each scenario can be found in the Water Support Document (BLM 2020h).

3.3.4.4 CUMULATIVE IMPACT ANALYSIS

Future water use for the other reported water use categories in the San Juan Basin is assumed to continue at current levels, and agricultural irrigation would continue to be the highest water use category in the San Juan Basin. See the Water Support Document (BLM 2020h) for more information about the 2018 RFD scenario, nitrogen completion scenario, slick water scenario, and combined scenario water use estimates. Water use associated with development of the NAU 2208 and BTWU 2308 cluster oil wells (148.12 AF) would comprise between 0.03% and 1.3% of the total estimated cumulative water use (depending on which cumulative water use scenario is considered) and between 0.6% and 25.5% of estimated cumulative water use in any given year (depending on which cumulative water use scenario is considered). Cumulative risks to groundwater quality from oil and gas development include potential contamination of freshwater aquifers from well integrity failures, spills, or loss of fluids during the drilling and completion processes associated with the 2018 RFD. The regulatory program discussed in the Water Support Document (BLM 2020h) and standard terms and conditions would greatly reduce cumulative risks to groundwater from the future well development.

3.3.5 Mitigation and Residual Impacts

Design features (detailed in Appendix H), which include limiting surface disturbance and conducting interim reclamation, would minimize the amount of water required for dust control. Design features to minimize the potential for spills that could impact water quality are also already included. As such, no additional mitigation is proposed. Residual impacts would be limited to the water use described in Section 3.3.3 (Environmental Impacts – Proposed Action), which could not be reduced without also adversely impacting air quality.

3.4 Issue 4: How would vehicle traffic and public road safety be impacted along the proposed haul truck route, which includes the communities of Counselor and Nageezi?

The analysis area for construction truck traffic along the proposed construction route extends from Bloomfield, New Mexico, to the proposed well pad cluster located in Nageezi and approximately 15 miles west of Counselor, New Mexico. Construction truck traffic would utilize U.S. Highway 550 (U.S. 550) and County Road (CR) 7900 to transport materials to the proposed projects sites (see Map E.5 in Appendix E).

Data for the proposed transportation routes were obtained from the New Mexico Department of Transportation (NMDOT) (2019a) for the year 2019. The data include the annual average daily traffic (AADT), which is the total volume of traffic on a highway or road segment for 1 year, divided by the number of days in the year, and represents traffic on a typical day of the year (NMDOT 2012). Collision data for New Mexico were obtained through the NMDOT Records and Information Management Department (NMDOT 2019b).

Key assumptions used in the transportation analysis are as follows:

- DJR would mobilize construction trucks and crews in Bloomfield, New Mexico, and travel south utilizing U.S. 550 until reaching Nageezi, New Mexico. Construction crews and materials may come to Bloomfield from a variety of locations; however, those origination points are speculative and are therefore not included in the analysis.
- The Proposed Action would be accessed using CR 7900. NMDOT was unable to provide AADT data or accident data for CR 7900. Based on the existing conditions described in Section 3.4.1, the analysis assumes an average of eight heavy truck round trips per day in addition to local and visitor traffic.
- CR 7900 is the preferred construction route for construction equipment and construction activities. The total number of residences included in this analysis also includes 45 residences off CR 7900 that share the same access point off U.S. 550 for approximately 8 miles.
- CR 7900 is also used to access the north entrance to Chaco Culture National Historic Park (NHP) from U.S. 550. Annual visitor numbers reported by the Chaco Culture NHP are from 1925 to 2019; there were a total of 47,342 visitors in 2019 (National Park Service [NPS] 2020a). There are two entrances to the Park: CR 7900 (north entrance) and NM State Road 57 (south entrance). The total visitors reported do not distinguish which entrance visitors entered. However, monthly traffic counts were reported from 1993 to 2004, and numbers for the north (CR 7900) and south (NM State Road 57) entrance are reported separately. The total number of vehicles that entered the park from 1993 to 2004 was 889,703; 649,509, representing 73% of annual visitors, entered from CR 7900, the north entrance (NPS 2020a, 2020b). In order to establish a baseline number of vehicles that used CR 7900 (north entrance) to access Chaco Culture NHP during 2019, SWCA assumed 73% of visitors in 2019 (47,342) accessed the Park from CR 7900, which totals 34,560 visitors. Assuming three people per car, 11,520 vehicles (34,560 divided by 3), or 32 vehicles per day, traveled CR 7900 to the park in 2019.
- The residences included in this analysis are within the Navajo Nation Chapter of Nageezi. Residences in the town of Counselor are not included in this analysis because the town is located approximately 15 miles east of CR 7900 and will not be directly impacted by construction traffic. However, community members within the Chapter of Counselor may use CR 7900 for recreational activities, including visiting Chaco Culture NHP, and are included in the reported visitor and traffic count numbers from Chaco Culture NHP.
- Approximately 3 to 4 months would be required to complete drilling and construction of each well pad and associated infrastructure. Pending DJR's construction schedule, construction may take place concurrently; however, if construction occurs sequentially, the Proposed Action would require a cumulative total of approximately 16 to 24 months to complete. Workers would be on-site between the hours of 6:00 a.m. and 6:30 p.m. 6 days per week (Monday–Saturday) for the duration of the Proposed Action.

3.4.1 Affected Environment

The primary construction truck route begins in Bloomfield, New Mexico, and continues south along U.S. 550 to Nageezi, New Mexico. From this point, the route travels south onto CR 7900 for approximately 5 miles, then heads east for approximately 2 miles along the Lybrook Resource Road (a large oil and gas access road), where it terminates at the proposed project sites (See Figure E.5 in Appendix E). U.S. 550 is a major transportation artery that connects northern New Mexico to the Albuquerque metropolitan area. The Chapters of Counselor and Nageezi, New Mexico, are located in the heart of the San Juan Basin oil and gas fields where daily oil and gas operations utilizing U.S. 550 are commonplace. There are 67 active wells along CR 7900 and within a 3-mile radius of the Proposed Action (Homeland Infrastructure Foundation-Level Data [HIFLD] 2020). Residents of the area and visitors travel by personal vehicles along CR 7900 to access Chaco Culture NHP. CR 7900 is also used to access public and tribal land for scenic and recreational activities, including hunting, rock hounding, and photography.

Table 3.12 represents data for the proposed construction truck route, which include the New Mexico roads, the distance of each road, the 2019 NMDOT AADT trend for each road, the 2019 NMDOT crash data for each road, the 2019 estimated vehicle trend for NPS visitor data to Chaco Culture NHP, and the type of road. According to 2019 NMDOT traffic data, average daily traffic on the 39-mile route ranged from 5,937 to 8,357 vehicles, with a resulting 46 crashes reported for the year. NMDOT was unable to provide AADT data or accident data for CR 7900. However, Chaco Culture NHP reported 47,342 visitors in 2019. Based on traffic count data from the NPS Stats Report website, the total number of vehicles that entered the Park from 1993 to 2004 was 889,703, of which 649,509 reported entering from CR 7900 (the north entrance); therefore, 73% of the total vehicles used CR 7900 (north entrance) to access the park (NPS 2020a, 2020b). Assuming 73% of visitors in 2019 accessed the Park from CR 7900, there were 34,560 visitors and, assuming three people per car (34,560 divided by 3), 11,520 vehicles total, averaging 32 vehicles per day, traveled CR 7900 to access Chaco Culture NHP in 2019. The NPS did not report number of accidents.

Table 3.12. AADT, Crash Data, and Vehicle Trends for Proposed Route

Route	Distance (miles)	2019 NMDOT AADT Trend	2019 Estimate of Vehicle Trends per NPS Visitor Data*	Number of Accidents	Type of Road
U.S. 550	39.0	8,357	N/A	46	four-lane paved state highway
San Juan CR 7900	21.0	N/A	11,520	N/A	two-lane paved roadway for 8 miles, then dirt road for 13 miles to Chaco Culture NHP entrance
Total	**44.1**	**8,357**	**11,520**	**46**	-

* Chaco Culture NHP 2019 annual reported visitors 47,342; from 1993 to 2004, an average of 74% visitors accessed the Chaco Culture NHP north entrance via CR 7900. Therefore, 35,560 visitors (73% of 47,342) in 2019 used CR 7900 to visit the park; assuming three people per vehicle, 11,520 vehicles traveled CR 7900 in 2019, equating to 32 vehicles per day (11,520 divided by 365).

N/A = Data are not available
Sources: HIFLD (2020); New Mexico Department of Information Technology (2020); NMDOT (2019a, 2019b); NPS (2020a, 2020b).

CR 7900 traffic is typically a mixture of residential traffic and oilfield traffic, in addition to the recreational traffic detailed above. The amount of residential traffic is unknown, but there are 45 residences within 0.75 mile east and west of CR 7900 from the U.S. 550 intersection south for approximately 8 miles and within 3-mile radius of the Proposed Action (HIFLD 2020). CR 7900 also hosts local residential traffic with an estimated 34 round trips per day (assuming 75% of household travels

to work each day). Additionally, 67 active wells are within a 3-mile radius; all vehicles traveling to these wells are likely to use CR 7900. Based on the operation numbers disclosed in Table 3.14, it is assumed there are about 67 light truck round trips through the analysis area each day.

With consideration of the AADT data and the use of each highway as part of the construction truck and operational route, the average AADT for the proposed route is 8,357 vehicle trips. In addition to AADT data, NMDOT provided AADT truck data for U.S. 550, which totals 1,577 heavy truck trips per calendar year. The total amount of all vehicles utilizing U.S. 550 totals 9,934 per calendar year. According to the 2019 NMDOT traffic record, heavy truck traffic comprises 1,577 vehicle trips (19%). Approximately 46 collisions were reported in 2019 in the affected area. A total of five collisions were reported as involving heavy trucks. Table 3.13 represents AADT trends and accident data, as provided by NMDOT and Chaco Culture NHP.

Table 3.13. 2019 NMDOT AADT and AADT Truck Trends and NPS Estimated Visitor Data and Associated Accidents for Proposed Route

Route	2019 AADT Trend	2019 AADT Truck Trend	2019 Estimate of Vehicle Trends per NPS Visitor Data*	Vehicles Accidents (Other Than Trucks)	Truck Accidents
U.S. 550	8,357	1,577	N/A	41	5
CR 7900	N/A	N/A	11,520	N/A	N/A
Total	**8,357**	**1,577**	**11,520**	**41**	**5**

N/A = data not available

Sources: HIFLD (2020); New Mexico Department of Information Technology (2020); NMDOT (2019a, 2019b); NPS (2020a, 2020b)

3.4.2 Environmental Impacts - No Action Alternative

Under the No Action Alternative, the BLM would deny approval of the APDs and ROW grants. DJR would retain its lease rights, but the Proposed Action would not occur. Production in the area would continue at its current rate, and other current land use in the area would continue. There would be no increased construction or operational truck traffic on U.S. 550 and CR 7900 or within the Counselor and Nageezi communities.

3.4.3 Environmental Impacts - Proposed Action

3.4.3.1 DIRECT AND INDIRECT IMPACTS

If the Proposed Action is approved, construction trucks and operational personnel would utilize the U.S. 550 and CR 7900 corridor and begin construction. Construction of each proposed project would take approximately 3 to 4 months per well pad and associated infrastructure, which includes well drilling and completion activities and may take place concurrently. However, construction could take a cumulative total of 16 to 24 months to complete the Proposed Action if completed sequentially. Approximately 10 to 15 standard oilfield pickup trucks will be used to transport construction personnel to the construction site each day. Approximately six to eight transport truck loads are expected to deliver equipment to the proposed project areas. Heavy equipment will be transported and left on-site until construction is complete. Workers will be on-site approximately 10 to 12 hours per day, 6 days per week (Monday–Saturday) for the duration of the construction through reclamation period. The workers would commute to the construction area early in the morning at 6:00 a.m. and will return in the evening at 6:30 p.m.

Table 3.14 represents the estimated duration of each construction component, total vehicle round trips, and average vehicle round trips per day.

Table 3.14. Total Average Daily Round Trips for All Construction Vehicles for the Proposed Project Areas

Project Construction Phase	Duration (days)	Total Number of Round Trips (Heavy Vehicles)	Total Number of Round Trips (Light Vehicles)	Average Daily Round Trips (Heavy Vehicles)	Average Daily Round Trips (Light Vehicles)	Total Average Daily Round Trips (All Vehicles)
Construction	12	4	24	0.25	2.00	2
Drilling	12	203	151	16.92	12.58	30
Completions	10	97	171	9.70	17.10	27
Flow testing	15	407	82	27.13	5.47	33
Pipeline connect	12	24	156	2.00	13.00	15
Reclamation	30	41	216	N/A	N/A	9

Source: Construction duration and total number of round trips provided by DJR (2020c).

Heavy vehicles are considered greater than 26,001 pounds of gross vehicle weight. Light vehicles are less than 19,501 pounds of gross vehicle weight.

N/A = data not available

The daily average round trips during the construction phase would range between two and 33 vehicles utilizing the U.S. 550 and CR 7900 corridor until the Proposed Action is completed.

After the five well pads and pipeline are constructed, within the span of up to 24 months if construction occurs sequentially, standard operational tasks and maintenance would begin. The construction of each new well pad would require more daily maintenance. As time progresses, each well pad would require less and less maintenance. Standard oilfield pickup trucks would visit each well pad. Table 3.15 shows the average daily well pad visits for maintenance activities after well pad construction.

Table 3.15. Average Daily Well Pad Visits by DJR Operational Staff

Month	Total Vehicle Visits per 30 Days	Average Daily Vehicle Visit
First month	73	2.4
Second month	63	2.1
Third month	48	1.6
Fourth month	39	1.3
Fifth month	34	1.1
Sixth month	30	1.0

Source: DJR (2020c).

During the first month, an average of 2.4 pickup trucks per day would visit each well on each pad. By the sixth month of operation, the number of vehicles visiting each well pad would be reduced by half, with 1.0 pickup truck visiting each well on each well pad once per day. The number of maintenance visits would be even further reduced after Year 3 of operation. It is expected that a DJR operator would have to visit each well once per month for the lifespan of the Proposed Action.

CR 7900 is the main thoroughfare for accessing Chaco Culture NHP via the north entrance, connecting rural residences to U.S. 550, and oil and gas traffic to the 67 active wells. This road has a wide demographic and age span from school-aged children to elderly community members. It is estimated that 34 residential round trips on average are completed each day. There are an additional 32 visitor round trips each day to Chaco Culture NHP and approximately 67 existing oil and gas traffic round trips each day. The Proposed Action would effectively result in a moderate increase in construction truck traffic for a temporary duration of either 3 to 4 months if construction occurs concurrently or 16 to 24 months if construction activities occur sequentially.

Given the amount of traffic that U.S. 550 hosts per day, the Proposed Action would have a negligible increase in construction and operational vehicle traffic, in addition to a negligible increase in traffic collisions per year.

3.4.4 Cumulative Impacts

3.4.4.1 CUMULATIVE IMPACT AREA

The analysis area established to determine cumulative impacts on vehicle traffic and public road safety are the geographical boundaries extending from Bloomfield, New Mexico, traveling south along the U.S. 550 corridor, along CR 7900 for approximately 3 miles south, and terminating at the intersection of the Lybrook Resource Road.

3.4.4.2 PAST AND PRESENT ACTIONS

There is very little development beyond oil and gas and residential homes within the geographic boundaries of the Chapter of Nageezi. Oil and gas development include both wells and the associated well pad with standard infrastructure and linear pipeline and access road development.

3.4.4.3 REASONABLY FORESEEABLE FUTURE ACTIONS

DJR is the lease holder for all lease parcels within the North Alamito and Betonnie Tsosie Wash units. Therefore, reasonably foreseeable future actions within and adjacent to the Chapter of Nageezi would include future DJR oil and gas–related projects including development of DJR's NAU and BTWU gathering system infrastructure, which will connect to their exiting NAU CLF and includes approximately 10 miles of pipeline. This would result in a reduction of product transportation, which would be a long-term beneficial impact due to the reduction of traffic impacts.

3.4.4.4 CUMULATIVE IMPACT ANALYSIS

The expansion of DJR's infrastructure would require more construction personnel and equipment accessing roads throughout the area. As with the Proposed Action, construction equipment and crews associated with reasonably foreseeable future actions are expected to assemble in Bloomfield, New Mexico, and travel approximately 39 miles to Nageezi, New Mexico, using U.S. 550. The impact from these actions would have a negligible increase in vehicle traffic and possible vehicle collisions for U.S. 550; however, CR 7900 would see a moderate increase of vehicle traffic during the construction of reasonably foreseeable wells (including the Proposed Action). It is estimated that eight heavy truck round trips are expected to utilize the U.S. 550 and CR 7900 corridor per day. Once construction is complete, each new well would require two trips daily for the first 6 months and one trip daily thereafter. Development of proposed DJR oil and gas–related projects, including their NAU and BTWU gathering system, would provide countervailing impacts to transportation, decreasing oil and gas–related truck traffic within the Nageezi community.

3.4.5 Mitigation and Residual Impacts

Design features (detailed in Appendix H), which include posting signage and instructing construction personnel on safe driving practices, would minimize the impact to potential vehicle accidents due to increased traffic, thus reducing the construction impact to the Nageezi community and visitors traveling to Chaco Culture NHP.

3.5 Issue 5: How would development of the Proposed Action impact the quality of life of nearby residents, including the communities of Counselor and Nageezi?

Quality of life impacts are generalized concerns voiced by potentially impacted communities and are not specifically defined in law, regulation, or Executive Order. The BLM has determined that there is the potential for localized air, visual resources, traffic and safety, and noise impacts that could affect quality of life, particularly during construction, for all residents and users in the area of analysis. Continued expansion of the oil and gas industry as a whole may also be perceived as having a negative effect on quality of life for people who value undeveloped landscapes and lack of artificial structures, including infrastructure such as pumpjacks, roads, and cleared pipeline ROWs.

The analysis area is the geographic boundaries of the Navajo Nation Chapters of Counselor and Nageezi. This analysis area was chosen because the Nageezi Chapter contains the community that would be the most impacted by the Proposed Action. The Counselor Chapter is also included because there would be indirect impacts for construction and operations road use from the Proposed Action. For this analysis, "quality of life" is defined as "a feeling of well-being, fulfillment, or satisfaction resulting from factors in the external environment" (Greenwood 2001). The quality of life definition was chosen for the focus on external environmental factors and due to a lack of data on existing quality of life issues for the analysis area.

3.5.1 Affected Environment

The Proposed Action is located within the Chapter of Nageezi and approximately 15 miles southwest of the town of Counselor, New Mexico, with a population of approximately 261 and 508 residents, respectively (Data USA 2014). The Proposed Action is located approximately 10 miles southeast of the Nageezi town center. U.S. 550 is the main access road to the residences within the town centers, and CR 7900 is a main access road to residences along CR 7900 within Nageezi town limits. There are approximately 45 residences within 0.75 mile east and west of CR 7900 from the U.S. 550 intersection south for approximately 8 miles and within a 3-mile radius of the Proposed Action (HIFLD 2020). The nearest residence is approximately 0.25 mile north of BTWU E35; approximately 0.4 mile east to BTWU G34; approximately 0.9 mile south to NAU I01 is, and approximately 1.4 miles southeast to NAU E01. There is a low level of existing oil and gas development within and surrounding the town centers of Counselor and Nageezi; however, there is a high level of existing oil and gas development within the geologic boundary of the Nageezi Chapter and along the CR 7900 road corridor, which may contribute to existing quality of life impacts for air quality, visual resources, traffic and safety, and noise impacts. There are 67 active wells along CR 7900 and within a 3-mile radius of the Proposed Action (HIFLD 2020).

3.5.2 Environmental Impacts- No Action Alternative

Under the No Action Alternative, the BLM would deny approval of the APDs and ROW grants. DJR would retain its lease rights, but the Proposed Action would not occur. Production in the area would

continue at its current rate, and other current land use in the area would continue. No resulting impacts to quality of life from air emissions, groundwater quality and quantity, traffic safety, noise, and scenic quality associated with the Proposed Action would occur.

3.5.3 Environmental Impacts- Proposed Action

Quality of life issues are generally subjective, and the intensity and importance of the impacts from the Proposed Action would likely vary from individual to individual, as well as from community to community. Therefore, quality of life issues are kept at a general level, both in terms of quality of life values and potential impacts. Potential impacts to the quality of life are included in Table 3.16. below.

Table 3.16. Potential Impacts of the Proposed Action to Quality of Life Values

Quality of Life Value	Potential Impact to Quality of Life
Air Emissions	Localized temporary impacts from construction, particularly dust, lasting an average of 3 to 4 months per proposed project. Quality of life may be temporarily affected by the presence of increased dust or other emissions during construction dependent on the proximity of residences to future potential development as well as atmospheric conditions such as wind speed and direction. Emissions would be minimized through application of air resource protection design features (see Appendix H - Design Features). As such, construction associated with the Proposed Action is unlikely to contribute to a violation of air quality regulations. In addition, the Proposed Action would result in annual increased criteria pollutant emissions from the exhaust emissions from equipment, compressor engines, generators, and flares; and VOCs resulting from oil storage activities (see Table 3.4 in Section 3.1.3). The emissions from the operation of well pads and wells would result in a 0.150% increase in NO_x, 0.003% increase in SO_2, 0.115% increase in CO, 0.442% increase in VOCs, 0.007% increase in PM_{10}, and 0.039% increase in $PM_{2.5}$. The majority of operational emissions associated with the Proposed Action would be minimized through design features provided in Appendix H.
Groundwater Quantity and Quality	Total potential groundwater use would comprise less than 0.02% of the 2015 San Juan Basin total water use and 0.3% of 2015 San Juan Basin total groundwater use. Drilling fluids would be recycled and transferred to other permitted closed-loop systems or returned to the vendor for reuse until DJR's gathering systems are in place and eventually will be transported via pipeline to the liquids facilities. Residual and flowback water would be recycled or disposed of at a waste disposal facility Any spills of non-freshwater fluids would be immediately cleaned up and removed to an approved disposal site. DJR will also notify the BLM within 24 hours of any reportable spill. Should a spill occur, the BLM would work with the NMOCD to immediately remediate spills on BLM land in accordance with federal and state standards, including 19.15.29.11 NMAC (see Section 3.3.3). See also the associated SUPOs on file with the BLM FFO for more information regarding DJR's closed-loop systems. There have not been any documented past instances of groundwater contamination in the analysis area attributed to well drilling (BLM 2020h). Due to DJR's adherence to the NMOCD's casing, cementing, and pressure-testing requirements to prevent contamination of aquifers, it is anticipated that the proposed wells would not impact water quality. Should a spill occur, the BLM would work with the NMOCD to immediately remediate spills on BLM land in accordance with federal and state standards, including 19.15.29.11 NMAC.
Traffic Safety	The Proposed Action would result in increased truck traffic on the U.S. 550 corridor and San Juan CR 7900. The proposed projects may be constructed sequentially, and there would be approximately two to 33 daily roundtrips for heavy and light vehicles, which would be a moderate increase of traffic per day during the construction of each of the proposed projects on San Juan CR 7900. There would be a negligible increase of vehicles on the U.S. 550 corridor. If the Proposed Action were to be constructed concurrently, there would be approximately 10 to 165 daily roundtrips on U.S. 550 and San Juan CR 7900. See Section 3.4 for additional detail on traffic impacts.

Quality of Life Value	Potential Impact to Quality of Life
Noise	Noise from construction activities, including well drilling/completion, pipeline installation, and access road construction may affect residences located within the analysis area by increasing background (ambient) noise levels. Although the ambient noise level within the analysis area has not been measured, the outdoor 24-hour average noise level (Ldn) in a rural residential area is approximately 40 dBA (EPA 1978). The residences nearest the proposed project areas range from approximately 0.25 mile north to 1.4 miles southeast. The nearest residence is located 0.25 mile north of BTWU E35 at a lower elevation, at the bottom of the cliff. The nearest residence to the BTWU G34 is approximately 0.4 mile east. The nearest residence to NAU I01 is approximately 0.9 mile south, and the nearest residence to NAU E01 is approximately 1.4 miles southeast. The rate of noise attenuation follows the inverse square law, or that noise attenuates at roughly 6 decibels (dB) as the distance doubles, beginning at 50 feet from the source (BLM 2020e). Based on the rate of noise attenuation and the approximate noise level emanating from construction associated with oil and gas activities, the predicted noise from construction activities from 500 feet to 7,920 feet would range from 65 dBA to 41 dBA, respectively (BLM 2020e). During most construction phases, the proposed projects are expected to temporarily increase daytime noise levels; however, the drilling and completion phases would potentially generate noise 24 hours per day until that phase is complete. Construction noise levels would increase from 40 dBA to a range of 55 to 68 dBA depending on the location of the sensitive noise receptor (BLM 2020e). In combination with ambient noise levels, the noise levels are expected to drop to approximately 43 dBA during the operations phase of the Proposed Action (BLM 2020e). Additional detailed analysis can be found in a recently permitted cluster project EA (DOI-BLM-NM-F010-2020-0029-EA) in close proximity to the Proposed Action and is incorporated herein by reference (BLM 2020e).
Scenic Quality	There are 45 residences within 0.75 mile east and west of CR 7900 from the U.S. 550 intersection south for approximately 8 miles and within a 3-mile radius of the Proposed Action (HIFLD 2020). The nearest residences to the Proposed Action range from approximately 0.25 mile north to 1.4 miles southeast. The nearest residence, located 0.25 mile north of BTWU E35, would not be visually impacted as the residence sits at the bottom of a cliff, out of view of the proposed well. The nearest residence to BTWU G34 is approximately 0.4 mile east; construction traffic will not access the road associated with the residence. The nearest structure to BTWU A35 is located 0.1 mile north and is a barn, not a residence. The nearest residence to NAU I01 is approximately 0.9 mile south and will not be visible. The nearest residence to the NAU E01 is approximately 1.4 mile southeast and will not be visible. Visual impacts from the Proposed Action would include moderate to weak contrast to undeveloped landscapes from well pads and associated infrastructure and the removal of vegetation. The proposed projects would meet Visual Resource Management (VRM) Class III objectives while in operation, which would partially retain the existing character of the undeveloped landscape and may attract attention but would not dominate the view of the casual observer. DJR would follow BLM prescriptions to reduce visual impact by painting all well pad infrastructure and production equipment covert green, which would minimize impacts to the viewshed and scenic quality.
Light Pollution	Light-emitting sources associated with the construction phase of the proposed projects include lights around the working area, lights on the drilling rig (which may include lights on the derrick), vehicle traffic, and flaring. These light sources would be temporary in nature and sporadically used. Night lighting would only be used during the 24-hour construction days during well completion, would last 1 to 2 weeks per well, and would be shielded or turned to the ground whenever possible. Flaring at night would be limited to only days and times necessary for project completion. The necessity and duration for flaring varies from well to well and is difficult to predict. During operations, lighting would be limited to only that needed to conduct work safely.

3.5.4 Cumulative Impacts

3.5.4.1 CUMULATIVE IMPACT AREA

The analysis area established to measure cumulative impacts on quality of life is the geographic boundaries of the Chapters of Counselor and Nageezi, where the impacts to quality of life for the Counselor and Nageezi communities is likely to occur from potential oil and gas development in the BLM FFO area.

3.5.4.2 PAST AND PRESENT ACTIONS

There is very little development beyond oil and gas and residential homes within the geographic boundaries of the Chapters of Counselor and Nageezi. Oil and gas development include both wells and the associated well pad with standard infrastructure and linear pipeline and access road development.

3.5.4.3 REASONABLY FORESEEABLE FUTURE ACTIONS

DJR is the lease holder for all lease parcels within the North Alamito and Betonnie Tsosie Wash units. Therefore, reasonably foreseeable future actions within and adjacent to the Nageezi Chapter would include future DJR oil and gas–related projects, including development of DJR's NAU and BTWU gathering system infrastructure, which will connect to their exiting NAU CLF and includes approximately 10 miles of pipeline. This would result in a reduction of product transportation, which would be a long-term beneficial impact due to the reduction of traffic impacts.

3.5.4.4 CUMULATIVE IMPACT ANALYSIS

The Proposed Action, together with past, present, and reasonably foreseeable cumulative actions, would contribute to the impacts to quality of life for Counselor and Nageezi residents within the analysis area. Some of the quality of life effects from the Proposed Action, along with reasonably foreseeable future well development, would be temporary, such as the increased traffic due to construction equipment traffic, the addition of project lighting, or flaring to the landscape. However, the development of well pads would create long-term disturbance that would impact the scenic quality of the area. In addition, the completion of proposed NAU and BTWU gathering system infrastructure would result in a reduction of product transportation, which would be a long-term beneficial impact due to the reduction of traffic, fugitive dust emissions, and visual and noise impacts.

3.5.5 Mitigation and Residual Impacts

Design features (detailed in Appendix H) include measures to reduce dust, noise, and light pollution, and to limit surface disturbance, as well as the type of lighting (limited to downcast lighting with covers for safety purposes only). Additional mitigation measures are located in the Mitigation and Residual Impacts section for each resource. In addition, the BLM had the authority to implement mitigation measures as COAs to reasonably reduce resource impacts. The BLM would ensure all laws, regulations, and polices are adhered to for the life of the projects. Accordingly, no further mitigation is proposed at this time.

3.6 Issue 6: How would the development of the Proposed Action impact environmental justice communities, primarily the communities of Counselor and Nageezi?

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," and BLM policy, requires federal agencies to determine if proposed actions have disproportionate and adverse environmental impacts on minority, low income, and American Indian populations of concern. Before determining if an environmental justice (EJ) population of concern is present, the BLM must first determine the area of analysis for the issue. The analysis area for this issue is the geographic boundary of San Juan and Sandoval Counties. This analysis area was chosen because San Juan and Sandoval Counties, specifically the Counselor and Nageezi Chapters/Communities, contain EJ communities that could experience the most direct impacts on quality of life as a result of the Proposed Action.

3.6.1 Affected Environment

The purpose of Executive Order 12898 is to identify and address, as appropriate, disproportionally high and adverse human health or environmental impacts on low-income populations, minority populations, or Indian Tribes that may experience common conditions of environmental exposure or effects associated with a plan or project. EJ refers to the fair treatment and meaningful involvement of people of all races, cultures, and incomes with respect to the development, implementation, and enforcement of environmental laws, regulations, programs, and policies.

The Proposed Action is located within a rural area of San Juan and Sandoval Counties, New Mexico, and is situated approximately 15 miles southwest of the Counselor community in Sandoval County, New Mexico. The Proposed Action is located on BLM-managed land and adjacent to Navajo Allotted surface. Multiple indigenous Native American populations inhabit the analysis area, and many Hispanic residents can trace their family's history of settlement of northern New Mexico back hundreds of years. These traditional and indigenous communities are intermingled with more recent Euro-American groups and immigrants. Ranchers, miners, farmers, oil and gas workers, and service industry providers are all part of the socioeconomic mixture of people in San Juan and Sandoval Counties.

The nearest community center to the Proposed Action is the Nageezi community and is approximately 8 miles northwest. There are 45 residences within 0.75 mile east and west of CR 7900 from the intersection of U.S. 550 for 8 miles and within a 3-mile radius of the Proposed Action (New Mexico Department of Information Technology 2020). Data from the U.S. Census Bureau (2019), Data USA (2014), and Counselor Chapter (2020) regarding population, percent minority, percent Native American, income level, and poverty rates in the Navajo Nation Counselor and Nageezi Chapters, as well as San Juan and Sandoval Counties and the state of New Mexico, are provided in Table 3.17.

Table 3.17. Population, Percent Minority, Percent Native American, Income Levels, and Poverty Data for Areas near the Proposed Action

Location	Population	Minority (%)	Native American (%)	Per Capita Income ($)	Median Household Income ($)	Poverty Rate Per Capita Income (%)
Nageezi	261	100	94	5,740	15,375	78
Nageezi Chapter	973	100	98	9,814	21,313	48
Counselor	508	100	91	N/A	21,964	N/A
Counselor Chapter	429	100	N/A	N/A	20,000	N/A
Sandoval County	146,748	62	14	29,255	63,802	10
San Juan County	125,043	62	39	22,067	44,841	24
New Mexico	2,081,015	62	9	22,146	46,748	20

N/A = Data not available

Sources: Counselor Chapter (2020), Data USA (2014), U.S. Census Bureau (2019)

The following EJ terminology developed by the Council of Environmental Quality (1997) is used in this analysis:

- Low-income population: A low-income population is determined based on annual statistical poverty thresholds developed by the U.S. Census Bureau and vary by family size and composition. Poverty is defined by the Office of Management and Budget and updated annually for inflation using the Consumer Price Index and uses a weighted average poverty threshold for a family of four and was calculated in 2019 at $26,172 (U.S. Census Bureau 2019).

- Minority: Minorities are individuals who are members of the following population groups: American Indian, Alaskan Native, Asian, Pacific Islander, Black, or Hispanic.
- Minority population area: A minority population area is so defined if either the aggregate population of all minority groups combined exceeds 50% of the total population in the area or if the percentage of the population in the area comprising all minority groups is meaningfully greater than the minority population percentage in the broader region.
- Comparison population: For the purpose of identifying a minority population or a low-income population concentration, the comparison populations used in this analysis are the surrounding counties and the state of New Mexico.

As shown in Table 3.17, the populations within the Counselor and Nageezi Chapters is 100% minority and 91% and 98% Native American, respectively. The poverty rate for the Nageezi Chapter is 48%, and the poverty rate within the town of Nageezi is 78%. Per capita income for the Nageezi Chapter is below the poverty threshold. The median household incomes for the Counselor and Nageezi Chapters are also below the poverty threshold. In general, income is lower, poverty is higher, and the percentage of minority and Native American populations is higher near the Proposed Action than in San Juan and Sandoval Counties and the state of New Mexico.

Given the above data and BLM experience with the residents and communities surrounding the Proposed Action, there are low-income, minority, and Native American populations of concern (or "Environmental Justice Populations and/or EJ communities"), as defined under Executive Order 12898, that may be disproportionately and adversely impacted by activities resulting from the Proposed Action.

3.6.2 Environmental Impacts- No Action Alternative

Under the No Action Alternative, the BLM would deny approval of the APDs and ROW grants. DJR would retain its lease rights, but the Proposed Action would not occur. Production in the area would continue at its current rate, and other current land use in the area would continue. No resulting impacts to quality of life for EJ communities would occur.

3.6.3 Environmental Impacts- Proposed Action

Conclusions about the potential for disproportionate adverse impacts on EJ populations are summarized in Table 3.18 below and are based on analysis of other issues in this EA with consideration of the EJ populations present in close proximity to the Proposed Action. The determination of potential adverse and disproportionate impacts from specific actions is the assessment of the BLM and should not be assumed to incorporate the position of specific, potentially impacted, EJ populations. The BLM realizes that additional impacts may be identified by the local community as specific development locations and types are proposed within the community. As a result, this section assesses only the impacts for the issues identified by the BLM during internal scoping. The BLM would continue to work with affected EJ populations to identify and address additional EJ issues as they arise.

Table 3.18. Summary of Conclusions from Issues Analyzed in Detail

Issue Analyzed in Detail	Summary of Impacts	Are potential impacts disproportionate to EJ populations?
Issue 1: Air Quality	An overall 0.756% increase in NAAQS and VOC emissions as a result of the Proposed Action; localized temporary impacts from construction, particularly dust, lasting an average of 3 to 4 months per proposed project.	Yes. Short-term fugitive dust ($PM_{2.5}$ or PM_{10}) during construction may be felt more by the residents in close proximity to future potential development. These residents are considered to be EJ populations. The design features provided in Appendix H and project-specific COAs would help to minimize potential effects that could be adverse and disproportionate. Overall air quality is a regional resource; thus, any adverse impacts to NAAQS would not be disproportionate to EJ populations in the region.
Issue 2: Greenhouse Gas and Climate Change	All GHG emissions would contribute to global GHG emissions. The Proposed Action is estimated to result in 19,552 MMT CO_2e from construction and operation and 32,740,500 MMT CO_2e from downstream GHG emissions. GHG emissions are associated with documented ongoing and reasonably foreseeable climate-related effects that may affect quality of life. For the San Juan Basin (southern Colorado to south-central New Mexico), these may include increased temperatures, decreases in overall water availability, and increases in frequency, intensity, and duration of both droughts and floods (BLM 2020f). However, the incremental contribution to global GHGs from the Proposed Action cannot be translated into any specific impact on climate change globally or regionally.	No. Any increase in GHG emissions that could impact climate change as described in the analysis would be regional or global in nature and would not be disproportionately borne by EJ populations in the region.
Issue 3: Water Quantity and Quality	6.44 AF per proposed well are anticipated for use in potential future development. The estimated water use would comprise less than 0.03% of the 2015 San Juan Basin total water use, 0.3% of 2015 San Juan Basin total groundwater use, and would result in a 1.3% increase over 2015 water use in the mining category for the San Juan Basin. With consideration of design features and regulatory requirements, no impacts to groundwater or surface water quality is expected from well drilling and completion. Spills could occur that could affect groundwater or surface waters.	Yes. While groundwater resources are regional in nature and water withdrawal is not anticipated to affect domestic water sources, any potential impacts on local water wells (for example, a spill that affects groundwater) could force residents to find other means of supplying water for domestic use. These residents are EJ populations. Design features and COAs would help to minimize this risk. Should a spill occur, the BLM and DJR would work with the NMOCD and/or the Navajo Nation Environmental Protection Agency to immediately remediate spills in accordance with federal and state standards, including 19.15.29.11 NMAC and the Navajo Nation Clean Water Act 104(a)(2)(C), 4 Navajo Nation Code 1304(A)(2)(c) (Navajo Nation 2014).
Issue 4: Traffic and Safety	Approximately two to 33 daily roundtrips for heavy and light vehicles on the U.S. 550 corridor and San Juan CR 7900 during construction of the proposed projects. This would result in a negligible increase along the U.S. 550 corridor but would have a moderate increase on San Juan CR 7900. If the Proposed Action were to be constructed concurrently, there would be approximately 10 to 165 daily roundtrips on U.S. 550 and San Juan CR 7900.	Yes. Any impacts associated with truck traffic and safety on U.S. 550 would be regional in nature, and impacts would not be disproportionate to EJ populations in the region. However, the increase in truck traffic on San Juan CR 7900 would be localized to the access roads utilized by the Nageezi community and visitors to Chaco Culture NHP. Therefore, there is the potential for the Proposed Action to disproportionately impact traffic congestion and risk of incident for EJ populations and visitors to the area along San Juan CR 7900. The design features provided in Appendix H and project-specific COAs would help to minimize potential effects that could be adverse.

Issue Analyzed in Detail	Summary of Impacts	Are potential impacts disproportionate to EJ populations?
Issue 5: Quality of Life	Potential for localized air, noise, visual resources, and traffic and safety impacts that could affect quality of life, particularly during construction. There are 45 residences within 0.75 mile east and west of CR 7900 from the U.S. 550 intersection south for approximately 8 miles and within a 3-mile radius of the Proposed Action (HIFLD 2020). Continued expansion of the oil and gas industry may be perceived as having a negative effect on quality of life for people who value undeveloped landscapes.	Yes. In general, quality of life values could be impacted during construction and operation and would be greater for the residents in close proximity to the Proposed Action. The residences nearest the proposed project areas range from approximately 0.25 mile north to 1.4 miles southeast. Any impacts associated with noise would be greater for the residents in close proximity to the proposed projects. Visual impacts associated with construction and operation of the proposed projects would create visual impacts that are greater for the residents that are within the viewshed of the Proposed Action. Impacts associated with light-emitting sources during construction and operation of the proposed projects would create visual impacts that are greater for the residents that are within the viewshed of the Proposed Action. These residents are identified EJ populations. Design features outlined in Appendix H and project-specific COAs would be applied to reduce effects that could be adverse and disproportionate to the EJ population.

3.6.4 Cumulative Impacts

3.6.4.1 CUMULATIVE IMPACT AREA

The analysis area established to consider cumulative impacts on EJ populations is the geographical boundaries of San Juan and Sandoval Counties, where the impacts to quality of life for the Counselor and Nageezi communities are likely to occur from potential oil and gas development in the BLM FFO area.

3.6.4.2 PAST AND PRESENT ACTIONS

There is very little development beyond oil and gas and residential homes within the geographic boundaries of the Chapters of Counselor and Nageezi. Oil and gas development include both wells and the associated well pad with standard infrastructure and linear pipeline and access road development.

3.6.4.3 REASONABLY FORESEEABLE FUTURE ACTIONS

DJR is the lease holder for all lease parcels within the North Alamito and Betonnie Tsosie Wash units. Therefore, reasonably foreseeable future actions within and adjacent to the Nageezi Chapter would include future DJR oil and gas–related projects, including development of DJR's NAU and BTWU gathering system infrastructure, which will connect to their existing NAU CLF and includes approximately 10 miles of pipeline. Other effects, such as the addition of oil and gas facilities to the region, would be relatively longer term, and would be in use for the lifetime of the foreseeable projects. In addition, the proposed NAU and BTWU gathering system would transport gas between facilities and reduce the need of trucks for gas transport; therefore, there would be a long-term immediate reduction of transportation truck traffic within the Chapters of Counselor and Nageezi. Other actions within the Chapters of Counselor and Nageezi would include residential development, which would introduce temporary disturbances from increased traffic, and noise and fugitive dust due to construction.

3.6.4.4 CUMULATIVE IMPACT ANALYSIS

The Proposed Action, together with past, present, and reasonably foreseeable cumulative actions, would contribute to the impacts to EJ communities within the analysis area. In general, the disproportionate impacts on the EJ population include issues related to air quality, water quality, traffic and safety, and quality of life. Some of the quality of life effects from the Proposed Action, along with reasonably foreseeable future well development, would be temporary, such as increase noise and visual impacts during construction activities, the addition of project lighting, or flaring to the landscape. DJR would follow BLM prescriptions to reduce visual impacts by painting all well pad infrastructure and production equipment covert green, which would minimize impacts to the viewshed and scenic quality for the EJ populations in closest proximity to the Proposed Action. In addition, the completion of proposed NAU and BTWU gathering system infrastructure would result in a reduction of product transportation, which would be a long-term beneficial impact due to the reduction of traffic, fugitive dust emissions, and visual and noise impacts.

3.6.5 Mitigation and Residual Impacts

DJR is coordinating an outreach program with the Navajo Nation Chapter Houses, Nageezi, Huerfano, and Counselor, to conduct informational meetings to allow residences the opportunity to identify adverse environmental impacts that may occur as a result of the proposed projects and reasonably foreseeable future projects in the analysis area. Design features (detailed in Appendix H) include measures to reduce dust, noise, and light pollution, and to limit surface disturbance to protect natural and cultural resources, as well as the type of lighting (limited to downcast lighting with covers for safety purposes only). Additional mitigation measures are located in the Mitigation and Residual Impacts section for each resource. The BLM would ensure all laws, regulations, and polices are adhered to for the life of the Proposed Action. Accordingly, no further mitigation is proposed at this time.

4 Consultation and Coordination

4.1 ESA Consultation

BLM FFO biologists have reviewed the Proposed Action and determined it would comply with threatened and endangered species management guidelines outlined in the biological assessment associated with the PRMP/FEIS (see Table 1.2 and the NEPA IDT checklist [Appendix G]).

In 2014, the yellow-billed cuckoo (*Coccyzus americanus*) was listed as threatened with proposed critical habitat. There is no nesting habitat for this species within or adjacent to the proposed project areas. The nearest designated critical habitat for this species is 84 miles to the southeast. Therefore, the Proposed Action would not impact this species.

The New Mexico meadow jumping mouse (*Zapus hudsonius luteus*) was listed as endangered in 2014. There is no riparian habitat within or adjacent to the proposed project areas. The nearest designated critical habitat for this species is 51 miles to the southeast. Therefore, the Proposed Action would not impact this species.

4.2 Tribal Consultation

Tribal consultation for the Proposed Action was initiated on a government-to-government basis by the BLM FFO with various Pueblos and Tribes of New Mexico and southern Colorado. A letter and map describing the proposed projects and inviting consultation with the BLM FFO was sent via certified mail

to each of the various Pueblos and Tribes listed in Table 4.1 on December 2, 2020 with a request for response within 30 days of receipt.

Table 4.1.

Pueblos and Tribes Who Received Consultation Requests from the BLM FFO

Tribe	Name
All Pueblos Council of Governors	Governors
Eight Northern Indian Pueblos Council	Governors
Five Sandoval Indian Pueblos	Governors
Jicarilla Apache Tribal Council	President Edward Velarde
Kewa Pueblo (Pueblo of Santo Domingo)	Governor Thomas Moquino, Jr
Nageezi Chapter House	President Ervin Chavez
Navajo Nation	President Jonathan Nez
Ohkay Owingeh	Governor Ron Lovato
Pueblo of Acoma	Governor Brian Vallo
Pueblo of Cochiti	Governor Charles Naranjo
Pueblo of Isleta	Governor Max Zuni
Pueblo of Isleta, Tribal Historic Preservation Office	Dr. Henry Walt
Pueblo of Jemez	Governor David Toledo
Pueblo of Laguna	Governor Wilfred Herrera, Jr.
Pueblo of Nambe	Governor Phillip A. Perez
Pueblo of Nambe, Tribal Historic Preservation Office	Lt. Governor Arnold J. Garcia
Pueblo of Picuris	Governor Craig Quanchello
Pueblo of Pojoaque	Governor Joseph M. Talachy
Pueblo of San Felipe	Governor Anthony Ortiz
Pueblo of San Felipe Department of Natural Resources	Pinu'u Stout, Director
Pueblo of San Ildefonso	Governor Perry Martinez
Pueblo of Sandia	Governor Stuart Paisano
Pueblo of Santa Ana	Governor Lawrence Montoya
Pueblo of Santa Ana Tribal Historic Preservation Office	Director Timothy Menchego
Pueblo of Santa Clara	Governor J. Michael Chavarria
Pueblo of Taos	Governor Edward Concha
Pueblo of Tesuque	Governor Robert Mora, Sr
Pueblo of Zia	Governor Fredrick Medina
Pueblo of Zuni	Governor Val R. Panteah, Sr.
Southern Ute Indian Tribe	Chairwoman Christine Baker-Sage
Ten Southern Pueblo Governor's Council	David Toledo, Chair
The Hope Tribe	Chairman Timothy L. Nuvangyaoma
Ute Mountain Ute Tribe	Chairman Manuel Hart

In response to the consultation letter, on January 19, 2021 the Pueblo of Santa Ana requested that the BLM send them a copy of the Class III archaeological report. The BLM emailed a copy of the cultural report to representatives from the Pueblo of Santa Ana on the same day. On October 27, 2020, the Hopi Tribe requested that the BLM send them a copy of the Class III archaeological report. After receiving this

request, the BLM emailed a copy of the cultural report to representatives from the Hopi Tribe, but didn't receive any subsequent feedback with specific concerns regarding this project. The Pueblo of Santa Ana did not reach out to the BLM-FFO to comment on this report, so consultation was deemed complete by the BLM Authorized Officer on April 14, 2021.

On January 5th, 2021 Tim Begay of the Navajo Nation requested ethnographic work be completed prior to making any decision on the proposed action. Beginning March 15th and ending on April 7th 2021, BLM FFO completed the requested ethnographic work.

4.3 New Mexico State Historic Preservation Office Consultation

Section 106 of the National Historic Preservation Act of 1966 (NHPA) and its implementing regulations require federal agencies to consider what impact their licensing, permitting, funding, or otherwise authorizing an undertaking, such as an APD or ROW, may have on properties listed in or eligible for listing in the National Register of Historic Places. Specific definitions for key cultural resources management concepts (such as undertakings, impacts, and areas of potential effect) are provided in 36 CFR 800.16.

The New Mexico BLM has a two-party agreement with the New Mexico State Historic Preservation Office (SHPO) (hereafter referred to as the Protocol) that implements an authorized alternative to 36 CFR 800 for most undertakings (BLM and SHPO 2014). The Protocol offers a streamlined process for reporting and review that expedites consultation with the SHPO.

The entire area of potential effect (APE) associated with the Proposed Action was archaeologically surveyed at a Class III level (100%), and reports were prepared and submitted to the BLM.

Four Class III Archaeological Surveys (NMCRIS No. 146574; BLM Report No. 2021(I)002F, & NMCRIS No. 146998; BLM Report No. 2021(I)002.1F, NMCRIS No. 145984; BLM Report No.2020(III)014F, NMCRIS No. 145985; BLM Report No. 2020(IV)001F) were conducted in the proposed project areas and during these surveys eight cultural sites (LA178234, LA82880, LA82881, LA197578, LA197579, LA197580, LA197581, & LA197582) were discovered. Two sites (LA82880, & LA178234) were determined to be Eligible for listing on the NRHP, three sites (LA82881, LA197578, & LA197580) were determined to be Not Eligible for listing, and three sites (LA197579, LA197581, & LA197582) were given an Undetermined eligibility status. The sites that were given an Eligible and Undetermined eligibility status will require protective fencing and the presence of an archaeological monitor. With adherence to these stipulations, the proposed project will have no effect to Historic Properties.

At the request of Tim Begay, Navajo Cultural Specialist for the Navajo Nation Heritage and Historic Preservation Department, ethnographic work was completed for this proposed project. On April 7th, 2021 the BLM-FFO received the report that documented this ethnographic work and observed that none of the sensitive cultural areas that had been identified were located in close proximity to the proposed projects. No specific concerns regarding these sensitive cultural areas were voiced during these interviews.

5 List of Appendices

Appendix A: List of Preparers

This EA has been prepared on behalf of the BLM by a contractor (SWCA Environmental Consultants [SWCA]) to comply with the requirements and guidelines prescribed by the BLM FFO. Portions of this document may be altered or written by the BLM FFO, as the BLM has the ultimate responsibility for the content of the EA. The table below contains a list of individuals that contributed to or reviewed this EA.

List of EA Preparers

Name	Area of Expertise	Organization
Gary Smith	Project Lead	BLM FFO
Kimberly Adams	Archaeologist	BLM FFO
Chris Wenman	Geologist	BLM FFO
Stanley Allison	Outdoor Recreation Planner	BLM FFO
Lola Henio	Tribal Liaison	BLM FFO
Tamara Faust	Lands/Access	BLM FFO
C. Gould	Range	BLM FFO
Heather Perry	Natural Resource Specialist	BLM FFO
John Kendall	Threatened and Endangered Species Biologist	BLM FFO
Jeff Tafoya	Natural Resource Specialist	BLM FFO
Ryan Joyner	Planning and Environmental Coordinator	BLM FFO
Whitney Thomas	Physical Scientist	BLM FFO
Kelly Haun	Project Manager	SWCA
Sarah Griffin	NEPA and Environmental Planner	SWCA
Janet Guinn	Senior NEPA QA/QC	SWCA

Appendix B: Acronyms and Abbreviations

2018 RFD	The Reasonably Foreseeable Development Scenario for Oil and Gas Activities: Mancos-Gallup Resource Management Plan Amendment (RMPA) Planning Area, Farmington Field Office, northwestern New Mexico
AADT	annual average daily traffic
AF	acre-feet
APD	Application for Permit to Drill
APE	area of potential effect
AQI	Air Quality Index
ARPA	Archaeological Resources Protection Act
BART	Best Available Retrofit Technology
bbl	barrel
BLM	Bureau of Land Management
BMP	best management practice
BTWU	Betonnie Tsosie Wash Unit
CAA	Clean Air Act
CFR	Code of Federal Regulations
CH_4	methane
CLF	central liquids facility
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COA	condition of approval
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
DJR	DJR Operating, LLC
EA	environmental assessment
EJ	environmental justice
EMNRD	New Mexico Energy, Minerals and Natural Resources Department
EPA	U.S. Environmental Protection Agency
FFO	Farmington Field Office
GHG	greenhouse gas

GMST	global mean surface temperature
H_2S	hydrogen sulfide
HAP	hazardous air pollutant
HIFLD	Homeland Infrastructure Foundation-Level Data
IDT	Interdisciplinary Team
IPCC	International Panel on Climate Change
Ldn	average noise level
KOP	key observation point
MBTA	Migratory Bird Treaty Act of 1918
mcf	thousand cubic feet
mg/L	milligrams per liter
MMT	million metric tons
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NATA	National Air Toxics Assessment
NAU	North Alamito Unit
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NHP	National Historic Park
NHPA	National Historic Preservation Act of 1966
NMAAQS	New Mexico Ambient Air Quality Standards
NMAC	New Mexico Administrative Code
NMCRIS	New Mexico Cultural Resource Information System
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Environment Department
NMOCD	New Mexico Oil Conservation Division
NMSO	New Mexico State Office
NO_2	nitrogen dioxide
NO_x	nitrogen oxide(s)
NORM	naturally occurring radioactive material
NPS	National Park Service
NSPS	New Source Performance Standards

O_3	ozone
Pb	lead
PDO	Pecos Distract Office
PL	Public Law
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns in diameter
PM_{10}	particulate matter equal to or less than 10 microns in diameter
ppm	parts per million
PRMP/FEIS	Proposed Resource Management Plan and Final Environmental Impact Statement
Proposed Action	North Alamito Unit 2208 and Betonnie Tsosie Wash Unit 2308 Cluster Oil and Natural Gas Wells Project
PUP	pesticide use proposal
PUR	pesticide use report
RCP	representative concentration pathway
RMP	Resource Management Plan
RMPA	Resource Management Plan Amendment
ROW	right-of-way
SHPO	New Mexico State Historic Preservation Office
SF	Standard Form
SIP	State Implementation Plan
SO_2	sulfur dioxide
Stat.	Statute
SUPO	Surface Use Plan of Operations
SWCA	SWCA Environmental Consultants
TCP	traditional cultural property
TDS	total dissolved solids
TUP	temporary use permit
USC	United States Code
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
VRM	Visual Resource Management
WESTAR-WRAP	Western States Air Resources Council–Western Regional Air Partnership

Appendix C: List of References

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Appendix D: Figures

Figure D.1. NAU I01: Overview of sagebrush shrubland vegetative community from the southeast corner of the proposed pad, facing northwest toward the proposed wellheads.

Figure D.2. NAU I01: Overview of sagebrush shrubland vegetative community from the northwest corner of the proposed pad, facing southeast toward the proposed wellheads.

Figure D.3. NAU I01: View from western edge of proposed well pad, facing west along proposed access road and pipeline route.

Figure D.4. NAU I01: View along proposed access road near fork with proposed NAU E01 access road, facing east toward proposed NAU I01.

Figure D.5. NAU E01: Overview of sagebrush shrubland vegetative community from the northern corner of the proposed pad, facing south toward the proposed wellheads.

Figure D.6. NAU E01: View from the western corner of the proposed pad, facing east toward the proposed wellheads.

Figure D.7. NAU E01: View from existing Lybrook Resource Road edge, facing south toward proposed TUPs and staging area.

Figure D.8. NAU E01: View from existing pipeline tie-in point for NAU CLF, facing west toward proposed TUPs and staging area in the distant background.

Figure D.9. BTWU G34: Overview of sagebrush shrubland vegetative community from the northwestern corner of the proposed pad, facing south toward the proposed wellheads.

Figure D.10. BTWU G34: Overview of access road and pipeline corridors, east of proposed pad, facing east.

Figure D.11. BTWU G34: Overview of access road and pipeline corridors, east of proposed pad, facing west toward proposed BTWU E35.

Figure D.12. BTWU E35: Overview of proposed well pad area, from the northwestern corner of pad, facing south toward proposed wellheads.

Figure D.13. BTWU E35: View facing north from the southwest corner of the proposed pad.

Figure D.14. BTWU E35: View facing east from the proposed pad access road and pipeline corridors.

Figure D.15. BTWU E35: View from proposed intersection to BTWU A35, facing southeast at the proposed access road and pipeline corridors that connect to the Lybrook Resource Road.

Figure D.16. BTWU A35: Overview of proposed well pad from the northwest corner of the proposed pad, facing south.

Figure D.17. BTWU A35: View facing east toward proposed pad from the proposed access road and pipeline corridor.

Figure D.18. BTWU G34: View facing south along proposed access road and pipeline corridors.

Figure D.19. BTWU G34: View of the location where the gas pipeline corridor will connect to DJR's Chaco Trunk line at the Lybrook Resource Road, facing south.

Figure D.20. BTWU G34: View facing west along pipeline corridor toward DJR's CLF and the intersection with the proposed NAU I01 and NAU E01 pipelines.

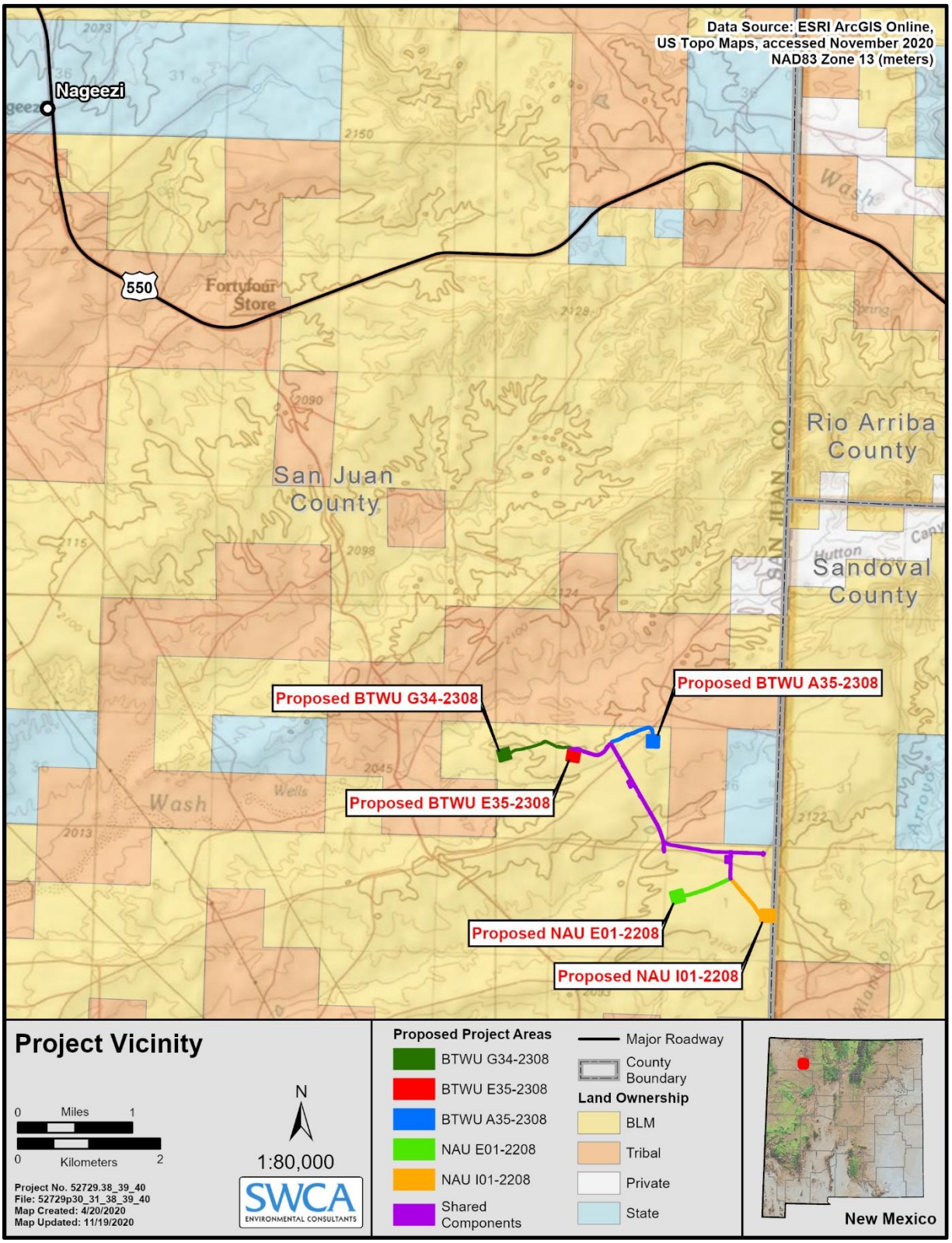
Figure D.21. NAU I01 and NAU E01 key observation point (KOP): View facing southwest toward the proposed pads, which will be tied into the existing DJR CLF facility on the left side of the photograph.

Figure D.22. BTWU G34 KOP: View from proposed access road and pipeline corridors west of the proposed pad, facing southwest.

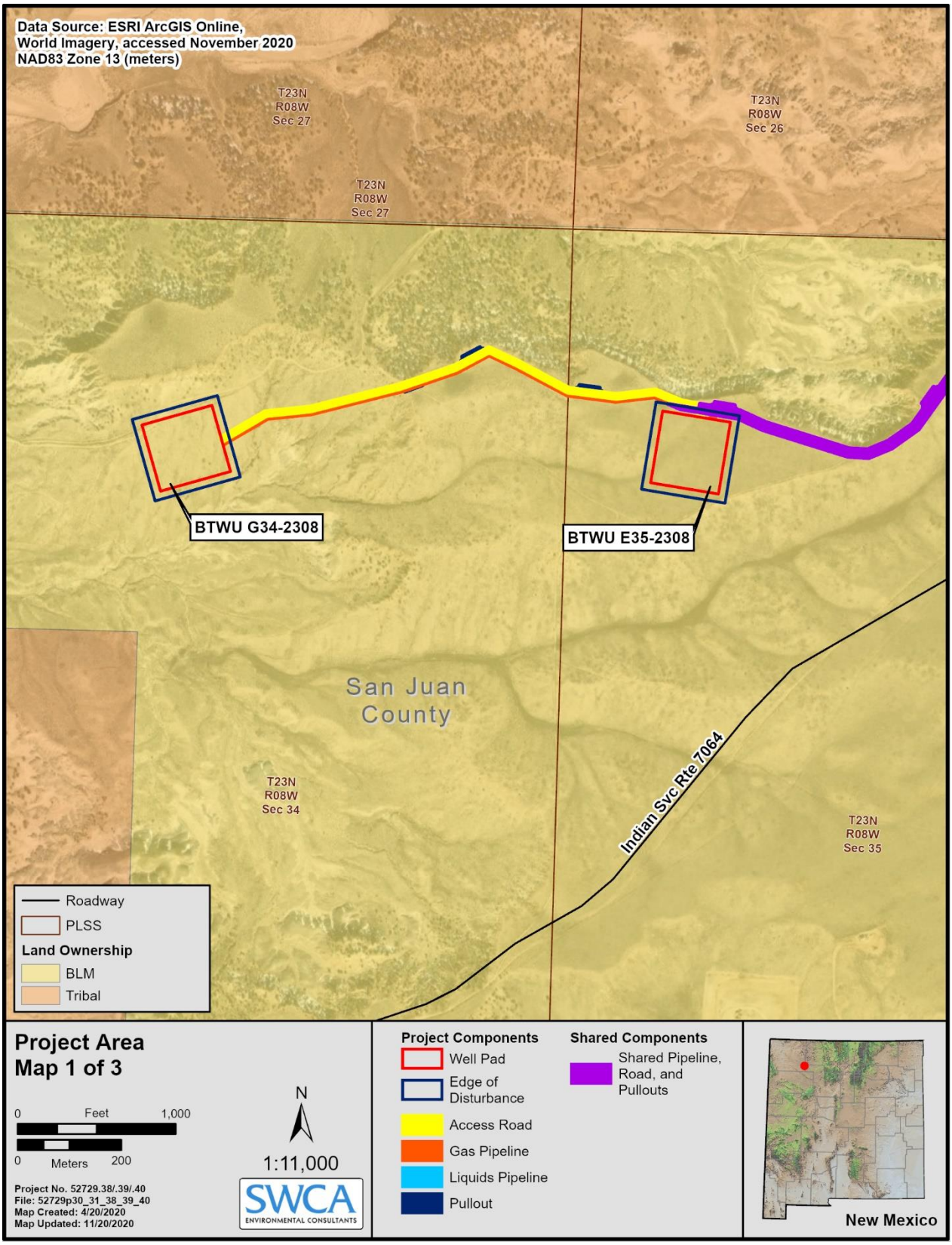
Figure D.23. BTWU E35 KOP: View from proposed access road and pipeline corridor facing southeast toward the proposed pad.

Figure D.24. BTWU A35 KOP: View from proposed access road and pipeline corridor facing south toward the proposed pad.

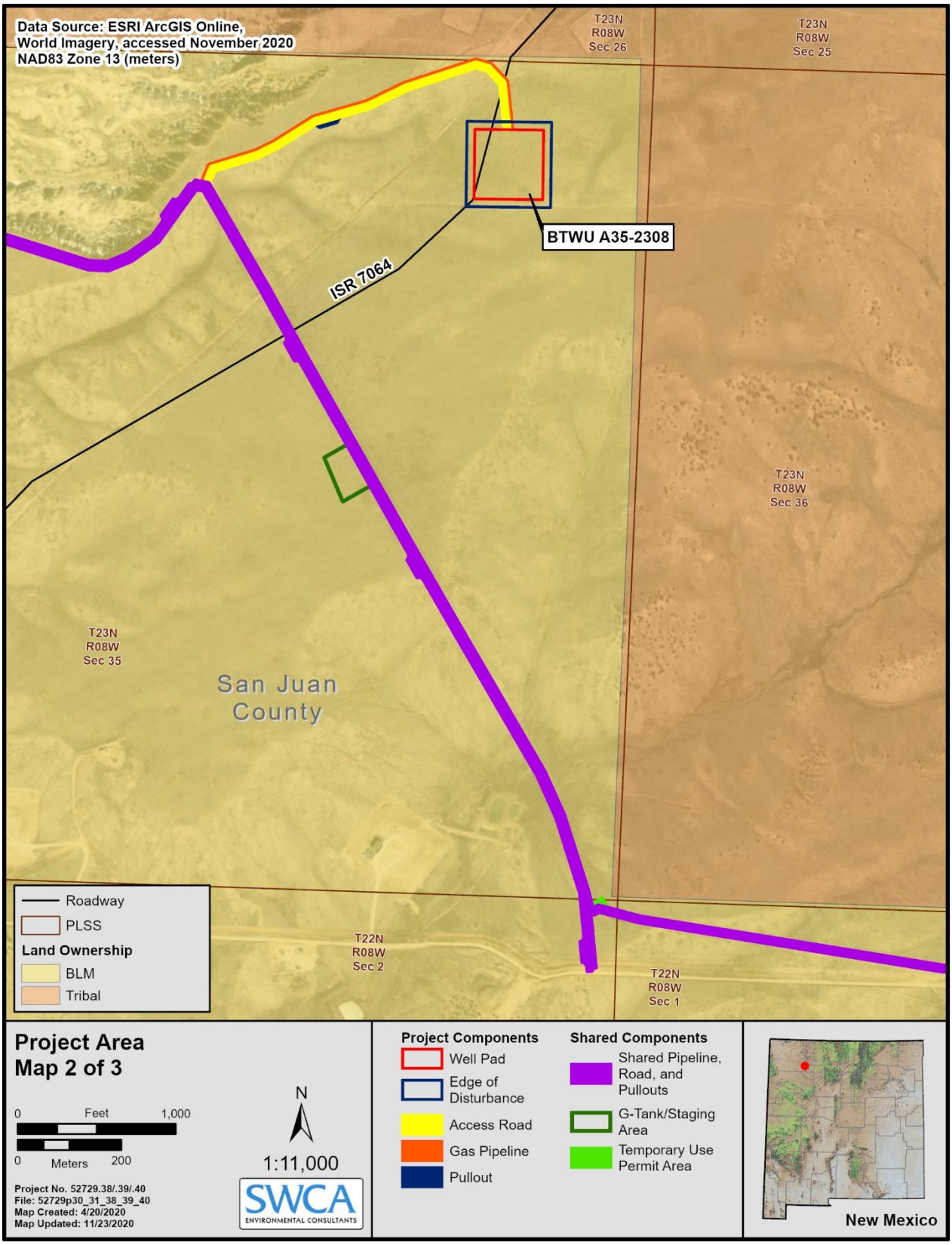
Appendix E: Maps



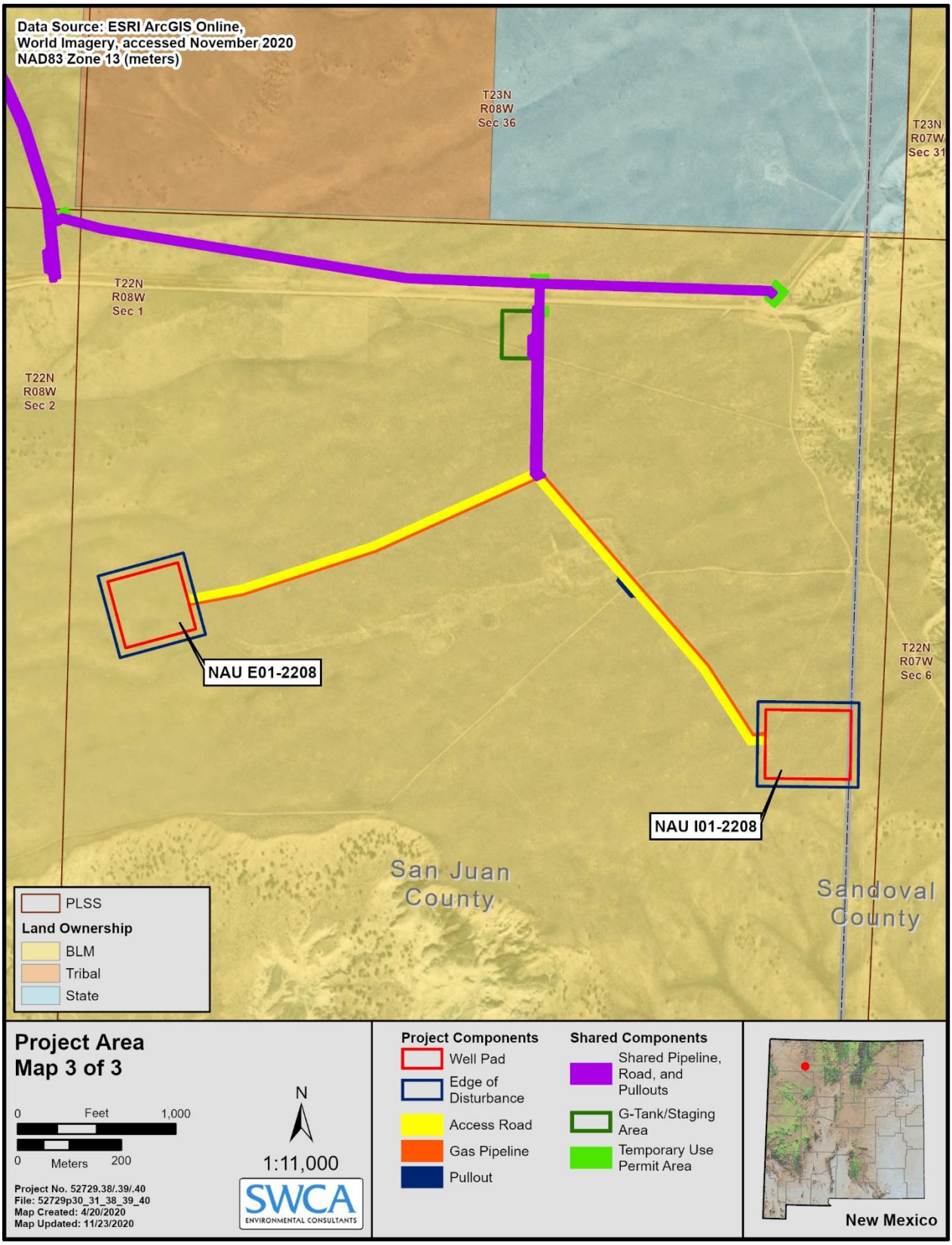
Map E.1. Project vicinity map.



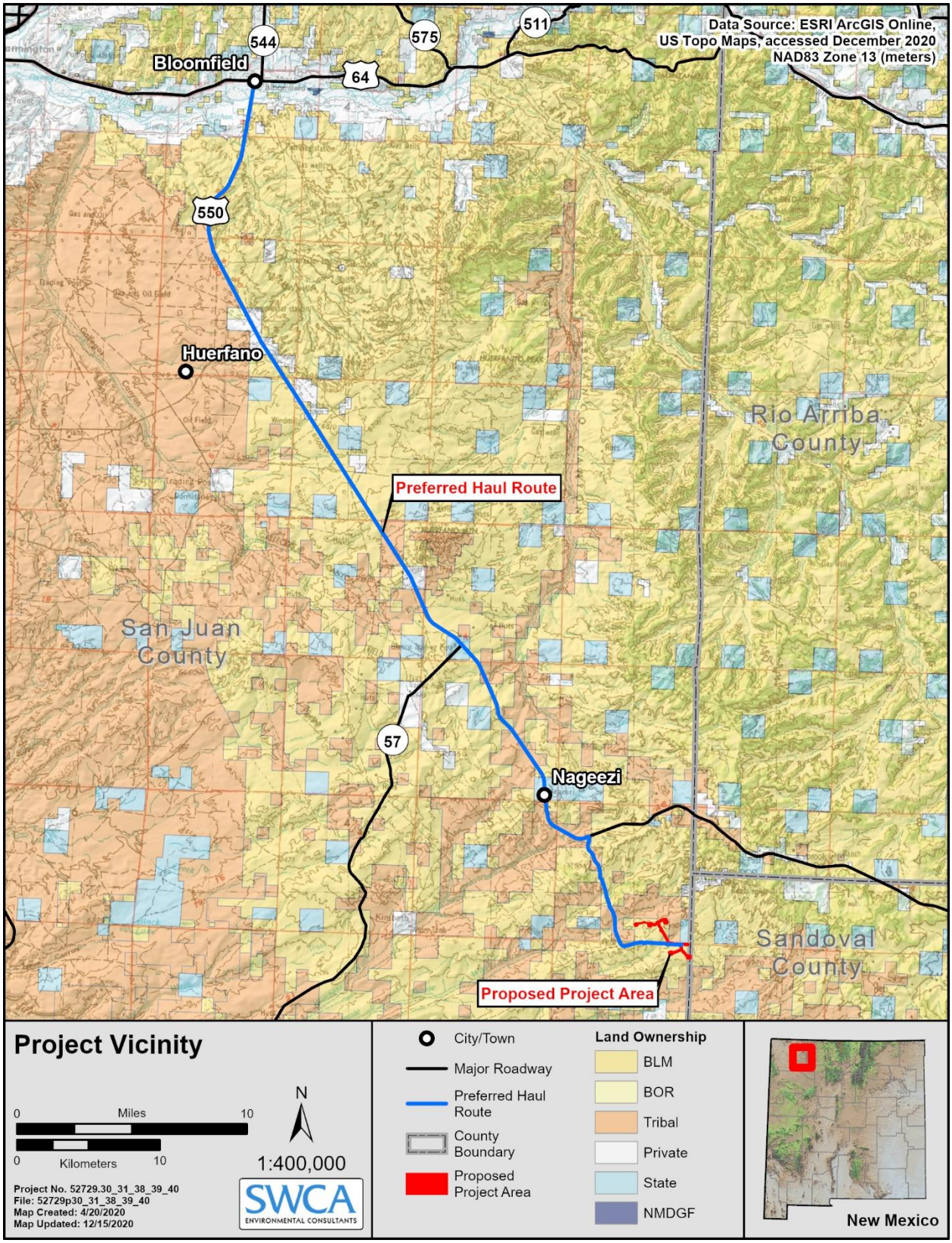
Map E.2. BTWU G34-2308 and BTWU E35-2308 project areas map.



Map E.3. BTWU A35-2308 project area map.



Map E.4. NAU E01-2208 and NAU I01-2208 project areas map.



Map E.5. Construction truck haul route.

Appendix F: Tables

Table 1.1. Permits, Regulations, and Approvals Relevant to the Proposed Project

Permit/Regulation/Approval	Issuing Agency	Status
Federal Permit, Approval, or Clearance		
APD	BLM	The applications are currently under review by the BLM and are the subject of this EA.
SF-299 Application for Transportation and Utility Systems and Facilities on Federal Lands	BLM	The ROW applications have been assigned serial/adjudication numbers by the BLM: NMNM-142509 (gas pipeline); NMNM-142509 01 (lay-flat TUPA); NMNM-142520 (liquids pipeline); NMNM-142520 02 (TUPA); and NMNM-142502 (access road), and are the subject of this EA.
Executive Order 12898	BLM	Section 3.6 describes impacts to minority and low-income populations.
Section 7 of the Endangered Species Act	U.S. Fish and Wildlife Service (USFWS)	The Proposed Action is in conformance with the biological assessment conducted for the RMP (BLM 2002). All fresh water used for pads, road construction, and well drilling and completion will be taken via a temporary lay-flat surface line from DJR's North Alamito Unit Water Source Well No. 7, point of diversion number SJ-4348. No new water depletions are associated with the Proposed Action. No further consultation with the USFWS is required.
Federal Noxious Weed Act (Public Law [PL] 93-629; 7 USC 2801 et seq. 88 Statute [Stat.] 2148)	BLM	Natural resource specialists conducted noxious weed surveys within the proposed project areas in May 2020 (NAU I01 and NAU E01), April 2020 (BTWU A35), and May 2020 (BTWU G34 and BTWU E35). See Table 1.4 for details.
Clean Water Act (CWA) Section 402 General Construction (Stormwater) Permit	U.S. Environmental Protection Agency and New Mexico Environment Department (NMED)	The proposed projects are exempt based on the 1987 Water Quality Act and Section 323 of the Energy Policy Act of 2005.
Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–712)	BLM	The BLM would comply with MBTA pre-construction nesting survey requirements.
Paleontological Resources Preservation Act of 2009 (Sections 6301–6312 of the Omnibus Public Lands Act of 2009, 16 USC 470aaa)	BLM	Table 1.4 describes potential impacts to paleontological resources.
CWA Section 404 Permitting Discharges of Dredge or Fill Material into Waters of the U.S. (including wetlands)	U.S. Army Corps of Engineers	During on-site meetings and natural resources surveys within the proposed project areas, natural resources specialists determined that there would be no impacts to waters of the U.S. Please refer to Table 1.4 for details.
Section 106 of the National Historic Preservation Act	BLM	Table 1.4 describes potential impacts to cultural resources. Any required further consultation with the State Historic Preservation Office would be conducted by the BLM.
State Permit, Approval, or Clearance		
New Mexico Executive Order 00-22 (regarding Noxious Weeds)	New Mexico Department of Agriculture	Natural resources specialists conducted noxious weed surveys within the proposed project areas in July 2018 (NU M35), July 2019 (NU B02), and December 2019 (NU G35 and NU H33). Details are in Table 1.4.
Clean Air Act New Mexico Air Quality Control Act	NMED	Impacts to air quality are described in Sections 3.1 and 3.2. The Proposed Action would be considered a minor source unit and may be permitted with a General Construction Permit per 20.2.72 New Mexico Administrative Code (NMAC). A notice of intent would need to be filed with NMED.

Table 1.2. Individuals and Groups Invited to the On-site Meeting

Name	Group
Bruce Baizel, Pete Dronkers	Earthworks
Thomas Singer, Erik Schlenker-Goodrich, Kyle Tisdale	Western Environmental Law Center
Mike Eisenfeld	San Juan Citizens Alliance
Samantha Ruscavage-Barz, Jeremy Nichols, Rebecca Sobel	WildEarth Guardians
Anson Wright	Chaco Alliance
Lori Goodman	Diné Care
Don Schrieber	Devil Springs Ranch
Joe Trudeau	Center for Biological Diversity
Miya King-Flaherty	Sierra Club
Tweeti Blancett	Interested Public
Pinu'u Stout	Pueblo of San Felipe
Sonia Grant	University of Chicago/Private Citizen
Daniel Tso	Interested Public
All Pueblo Council of Governors	All Pueblo Council of Governors
Michael Casaus	New Mexico Wilderness Society

Table 1.3. Issues Identified for Detailed Analysis

Issue Number	Issue Statement	Impact Indicator
Issue 1	How would emissions generated by equipment associated with the Proposed Action impact air quality?	Emissions
Issue 2	How would the future potential development of the Proposed Action contribute to greenhouse gas (GHG) emissions?	Emissions
Issue 3	How would future drilling and completion operations associated with the Proposed Action impact groundwater quality and quantity?	Water Volumes Number of Wells
Issue 4	How would vehicle traffic and public road safety be impacted along the proposed haul truck route, which includes the communities of Counselor and Nageezi?	Increased Traffic
Issue 5	How would the development of the Proposed Action impact the quality of life of nearby residents, including the communities of Counselor and Nageezi?	Noise, Visual, Air Quality, Traffic, Water Quality
Issue 6	How would the development of the Proposed Action impact environmental justice communities, primarily the communities of Counselor and Nageezi?	Quality of Life, Traffic, Noise, Visual, Water Quantity and Quality, and Air Quality, including GHGs

Table 1.4. Issues Identified but Eliminated from Detailed Analysis

Issue Statement	Rationale for Not Further Discussing in Detail in the EA
How would proposed ground-disturbing construction, operation, and maintenance activities impact cultural resources?	Impacts to cultural resources from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. There are no Chaco Culture Archaeological Protection Sites or United Nations Educational, Scientific and Cultural Organization World Heritage Sites within or near the proposed project areas. Four Class III Archaeological Surveys (NMCRIS No. 146574; BLM Report No. 2021(I)002F, & NMCRIS No. 146998; BLM Report No. 2021(I)002.1F, NMCRIS No. 145984; BLM Report No.2020(III)014F, NMCRIS No. 145985; BLM Report No. 2020(IV)001F) were conducted in the proposed project areas and during these surveys eight cultural sites (LA178234, LA82880, LA82881, LA197578, LA197579, LA197580, LA197581, & LA197582) were discovered. Two sites (LA82880, & LA178234) were determined to be Eligible for listing on the NRHP, three sites (LA82881, LA197578, & LA197580) were determined to be Not Eligible for listng, and three sites (LA197579, LA197581, & LA197582) were given an Undetermined eligibility status. The sites that were given an Eligible and Undetermined eligibility status will require protective fencing and the presence of an archaeological monitor. With adherence to these stipulations, the proposed project will have no effect to Historic Properties.Details of the cultural resources surveys of the proposed project areas, as well as results of Section 106 consultation and government-to-government consultation, are detailed in Chapter 4. Project design features and best management practices (BMPs) (detailed in Appendix H) would mitigate impacts to cultural resources to the point that detailed analysis is not warranted. The proposed projects would be in compliance with Section 106 of the National Historic Preservation Act (NHPA).
How would proposed ground-disturbing construction, operation, and maintenance activities impact Native American religious concerns or other concerns?	Impacts to traditional cultural properties (TCPs) from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. Results of the cultural resources surveys of the proposed project areas, as well as results of NHPA Section 106 consultation and government-to-government consultation, are provided in Chapter 4. Per the BLM's cultural records of review, there are no known TCPs or sensitive cultural areas present in the proposed project areas (BLM 2021). No project-specific ethnographic study was performed outside of ongoing BLM-led tribal consultation and engagement to address any potential ethnographic concerns. Additionally, DJR conducts an ongoing outreach program with the Navajo Nation Chapter Houses, Nageezi, Huerfano, and Counselor, to conduct informational meetings to allow residences the opportunity to identify adverse environmental impacts that may occur as a result of the proposed projects and reasonably future projects in the general area of DJR's leases. Because no Native American religious concerns are known to occur within the vicinity of the project area, further detailed analysis was not warranted. The proposed projects would be in compliance with the American Indian Religious Freedom Act of 1978 and Section 106 of the NHPA.
How would proposed ground-disturbing construction, operation, and maintenance activities impact paleontological resources?	Impacts to paleontological resources from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. SWCA consulted with the BLM FFO regarding the potential for paleontological resources to occur within the proposed project areas. The proposed projects are located within the Lybrook Fossil BLM specially designated area for paleontology and also in an area of known paleontological resources within the Nacimiento Formation (Potential Fossil Yield Classification [PFYC] 5). The BLM's geologist reviewed the project areas and determined that no surveys are needed because of the lack of exposure of unweathered or non-reworked geologic units and concluded that paleontological clearance has been obtained and that project design features and BMPs (detailed in Appendix H) would mitigate impacts to paleontological resources to the point that detailed analysis is not warranted (BLM 2020b, 2020c). The Proposed Action would be in compliance with the Paleontological Resources Preservation Act of 2009.
How would proposed project activities impact range improvements and livestock mobility associated with the existing allotment within the proposed project areas?	Impacts to rangeland resources, including grazing allotments, from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The proposed project areas are located within the 47,698-acre Largo Community Allotment (No. 5083) and the 19,127-acre Escavada AMP Allotment (No. 6014). The Proposed Action would disturb 64.9 acres, which is 0.1% of the total allotments' acreage. The Proposed Action would not directly impact any existing range improvements or long-term trend plots. Project design features (detailed in Appendix H) would mitigate impacts to range improvements and livestock to the point that detailed analysis is not warranted.

Issue Statement	Rationale for Not Further Discussing in Detail in the EA
How would vegetation removal during proposed construction activities impact suitable foraging and nesting habitat for migratory birds?	Impacts to wildlife (including migratory birds) from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The BLM FFO manages approximately 435,500 acres within the Great Basin desert scrub plant community (BLM 2003b). The Proposed Action would result in the clearing of 64.9 acres of poor to marginal migratory bird nesting and foraging habitat within sagebrush shrubland (which is part of the Great Basin desert scrub plant community). The total impacts associated with the proposed ground-clearing activities represent approximately 0.1% of this community within the BLM FFO. Migratory bird nest surveys will be performed prior to any construction activities (May 15–July 31). Project design features (detailed in Appendix H of the EA) would mitigate impacts to a degree that detailed analysis is not warranted. Any active nest found will be protected from proposed project activities. The Proposed Action would be in compliance with the MBTA.
How would vegetation removal and increased noise during proposed construction activities impact federally listed threatened, endangered, and candidate species?	Impacts to federally listed species from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The proposed project areas do not provide suitable habitat for any federally listed species (BLM 2018a, 2018b). Additionally, the Proposed Action would not use any surface water that could affect federally listed threatened, endangered, and candidate species; all fresh water used for pad, road construction, and well drilling and completion would be taken from DJR's NAU WSW No.7, point of diversion authorization number SJ -4348. There would be no new water depletions associated with the Proposed Action. Further detailed analysis is not warranted. The Proposed Action would be in compliance with the ESA and with the PRMP/FEIS and associated biological assessment (BLM 2002). No further consultation with the U.S. Fish and Wildlife Service (USFWS) is required.
How would vegetation removal and increased noise during proposed construction activities impact non-federal special-status species?	Impacts to special-status species from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The proposed project areas are not within suitable habitat for Clover's cactus (Sclerocactus cloverae) (BLM 2018a), which is listed by the BLM as a sensitive species (BLM 2017, 2018b). In 2016–2017, previously known as subspecies Brack's hardwall cactus (Sclerocactus cloverae ssp. Brackii. Biological surveys for the proposed project areas were conducted in February, May, and July. No suitable habitat was observed for and BLM sensitive plant species. Prairie dog towns were observed within PPA. DJR shifted the preliminary access road and pipeline alignment to the NAU I01 and NAU E01 projects to avoid impacting observed prairie dog colonies that where inactive at the time of the biological survey but could provide nesting habitat for burrowing owls. Active prairie dog colonies were also observed along the proposed access road and pipeline for the BTWU G34, BTWU E35, and BTWU A35 project areas. The proposed access road and pipeline is located along an existing ROW; an alternative route was not feasible due to other active colonies within the area and the proposed pipeline is being placed adjacent to an existing water line (See biological survey report). The BLM/FFO has determined that the proposed project areas are not within suitable habitat for Clover's cactus, as well as all other special-status species with potential to occur in the BLM FFO. The BLM also stated that there may be some loss of prairie dog individuals, but overall, the impacts are minimal and there is no need to move the project away from the ROW (BLM 2020d). If ground- or vegetation-disturbing activities are scheduled to occur within the migratory bird nesting season (May 15–July 31), a pre-construction migratory bird nest and burrowing owl survey (from 4/1-8/1) of the proposed project areas would be performed by BLM/FFO or approved biological consultant at BLM/FFO's request. Project design features (detailed in Appendix H) would mitigate potential impacts to special-status species to the degree that detailed analysis is not warranted.

Issue Statement	Rationale for Not Further Discussing in Detail in the EA
How would proposed project activities impact the socioeconomics of the Nageezi and Counselor communities?	The proposed cluster project EA would provide positive socioeconomic benefit through the pooling of oil and gas resources. This pooling and unitization of resources would provide marginal positive benefit overall but would not represent a major change to the socioeconomic settings that are already in place in the Nageezi and Counselor Chapter region. Pooling and unitization are general legal structures which allow for the combination of mineral and/or oil and gas leasehold interests in order to accommodate agency regulatory requirements. Each of these "structures" provide for a defined method of sharing production among the interest owners in a combined area or unit and the maintenance of the leases included in the applicable unit by allowing operations on, or production from, anywhere on the unitized area. The Proposed Action would allow for greater pooling for the Nageezi and Counselor communities. New Mexico has enacted broad legislation regarding the establishment of spacing or proration units from which oil and gas may be produced with emphasis on protecting correlative rights without waste of oil or gas in the pool and the reservoir energy. To this end, the New Mexico Oil Conservation Division (NMOCD) has established statewide spacing and establishes field pool rules for specific spacing where the facts indicate the state spacing pattern should be altered to carry out the goal of protecting correlative rights and preventing waste. A recent update of NMOCD rules and regulations included an independent section for location of wells and spacing unit specific to horizontal wells. In that context, the NMOCD notices hearings when proposed horizontal spacing orders are being considered and solicits the input of the BLM. BLM will likewise involve the Bureau of Indian Affairs/Federal Indian Minerals Office for concurrence on their recommendations to the NMOCD. Even inside a unit, the operator is required to meet subsurface setbacks from the unit boundary and comply with specific configurations of the horizontal spacing unit.
How would proposed project activities and surface disturbance/presence of facilities impact the viewshed in the region?	Impacts to visual resources from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The Proposed Action is within Visual Resource Management (VRM) Class III (Class I allows the least modification, while Class IV allows the most) as prescribed and analyzed in the PRMP/FEIS (BLM 2003b), as amended. Within VRM Class III areas, the level of change to the landscape can be moderate, and management activities include partially retaining the existing character of the landscape. The level of change from the projects may attract attention but would not dominate the view (see key observation points in Figures D-21 thorough D.24 in Appendix D), and the Visual Contrast Rating worksheets completed for the proposed projects (Appendix K) indicate that the proposed projects would result in a weak to moderate contrast in the surrounding area, which is compatible with VRM Class III management objectives. DJR would camouflage all well pads and production equipment by painting them covert green, which would minimize impacts to the viewshed and scenic quality. Project design features (detailed in Appendix H) would mitigate visual impacts to a degree that detailed analysis is not warranted.
How would lighting associated with proposed construction activities impact stargazing potential within the surrounding area?	The proposed project areas are approximately 18 miles from Chaco Culture National Historical Park and thus would not impact stargazing from that area. Light-emitting sources associated with the construction phase of the proposed projects include lights around the working area, lights on the drilling rig (which may include lights on the derrick), vehicle traffic, and flaring. Lighting associated with the proposed projects would only occur between the hours of 6:00 a.m. and 6:30 p.m. These light sources would be temporary in nature and sporadically used. Night lighting would be used only during the 24-hour construction days during well completion, would last 1 to 2 weeks per well, and would be shielded or turned to the ground whenever possible. DJR will capture all gas from the proposed wells and convey the gas through the proposed gas pipeline to connect to their existing Chaco Trunk Gas pipeline; no flaring will occur on any of the proposed well pads. If flaring will be performed, and if it occurs at night would be limited to only days and times necessary for project completion. The necessity and duration for flaring varies from well to well and is difficult to predict. During operations, lighting would be limited to only that needed to conduct work safely. Project design features (detailed in Appendix H) would mitigate impacts to stargazing to a degree that detailed analysis is not warranted.

Issue Statement	Rationale for Not Further Discussing in Detail in the EA
How would noise and visual resource issues associated with the Proposed Action impact residences?	The residences nearest the proposed project areas range from approximately 0.25 mile north to 1.4 miles southeast. The nearest residence at 0.25 mile is located to the north of the BTWU E35 at a lower elevation and precludes impacts to this residence as it is located at the bottom of the cliff. The nearest residence to the BTWU G34 is approximately 0.4 mile east; construction traffic will not access the road associated with the residence. The nearest structure to the BTWU A35 is located 0.1 mile north and is a barn, not a residence. The nearest residence to the NAU I01 is approximately 0.9 mile south and will not be visible. The nearest residence to the NAU E01 is approximately 1.4 miles southeast and will not be visible. As stated above, the proposed projects would result in a weak to moderate contrast in the surrounding area, which is compatible with VRM Class III management objectives. The Proposed Action would result in an increase in truck traffic on the U.S. Highway 550 corridor and San Juan County Road 7900. Area roads are shared with residential properties and visitors to Chaco Culture National Historical Park. Traffic related to the proposed projects would be added to industrial traffic already present; there would be an additional approximately two to 33 roundtrips for heavy and light vehicles during the construction of the proposed projects. The current noise levels in the residential areas are assumed to be a mean value of 40 A-weighted decibel (dBA) average noise level (Ldn) (U.S. Environmental Protection Agency 1978). During most construction phases, the proposed projects are expected to temporarily increase daytime noise levels; however, the drilling and completion phases would potentially generate noise 24 hours per day until each phase is complete. Construction noise levels would increase from 40 dBA to a range of 55 to 68 dBA depending on the location of the noise receptor (BLM 2020e). In combination with ambient noise levels, the noise levels are expected to drop to approximately 43 dBA during the operations phase of the Proposed Action (BLM 2020e). A detailed analysis can be found in a recently permitted cluster project EA (DOI-BLM-NM-F010-2020-0029-EA) in close proximity to the Proposed Action and is incorporated herein by reference (BLM 2020e). Project design features (detailed in Appendix H) would mitigate impacts to any nearby residents to a degree that detailed analysis is not warranted.
What is the potential for the spread of noxious weeds and invasive plants as a result of the proposed projects?	The spread of weeds associated with BLM FFO–wide oil and gas development was analyzed in the PRMP/FEIS (BLM 2003b), as amended. Project design features (detailed in Appendix H) would mitigate the spread of weeds to the degree that detailed analysis is not warranted. The Proposed Action would be in compliance with the Federal Noxious Weed Act and New Mexico Executive Order 00-22.
What vegetation impacts would occur as a result of proposed ground-disturbing activities?	Impacts to upland vegetation from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The BLM FFO manages approximately 435,500 acres within the Great Basin desert scrub plant community (BLM 2003b). The Proposed Action, which would result in the clearing of 69.4 acres of sagebrush shrubland (which is part of the Great Basin desert scrub plant community), would impact approximately 0.1% of this community within the BLM FFO. Project design features (detailed in Appendix H) would mitigate impacts to vegetation to the degree that detailed analysis is not warranted.
How would storage and transportation of hydrocarbon liquids impact drinking water sources or surface waters?	The proposed wells would be drilled using a closed-loop system to contain drill cuttings and fluids. The total depth of the proposed well bores would be about 5,990 to 10,515 feet below the ground surface. The producing zone targeted by the Proposed Action is well below any underground sources of drinking water. All chemicals stored on-site would be properly contained. On-site containment structures such as containment dikes, containment walls, and drip pans would be impervious and would be maintained to prevent a discharge to waters of the U.S. BMPs would ensure that no materials are discharged into downstream jurisdictional water features. Project design features (detailed in Appendix H) would mitigate impacts to drinking water and surface waters to the degree that detailed analysis is not warranted.
What is the potential for impacts to oil and gas/energy production?	Impacts to oil and gas resources from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The commitment of these resources is also analyzed at the lease level. The Proposed Action would contribute to future mineral development within the NAU and BTWU. Further detailed analysis is not warranted.
What are potential impacts from waste (hazardous materials) associated with ground-disturbing activities?	Project design features (detailed in Appendix H), as well as the adherence to Onshore Oil and Gas Operations regulations (43 CFR 3160), would mitigate impacts associated with waste to the degree that detailed analysis is not warranted.

Issue Statement	Rationale for Not Further Discussing in Detail in the EA
How would the construction and operation phases of the proposed project impact recreation and access to BLM land (for uses such as hunting, fishing, shooting, etc.)?	Impacts to recreation from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. The proposed project areas are not located within a specially designated recreation area. Dispersed recreation opportunities similar in type are readily available across a wide area in and around the Proposed Action. The proposed projects would not restrict recreation opportunities since recreation is dispersed throughout the area; therefore, detailed analysis is not warranted.
How would activities and facilities associated with the proposed project impact public access to BLM land?	Impacts to land and access from BLM FFO–wide oil and gas development were analyzed in the PRMP/FEIS (BLM 2003b), as amended. While public access roads and ROWs are present in the immediate area and would be used by personnel during all phases of the proposed projects, access to the public would not be restricted (other than the usage of potential, temporary flaggers, or other safety features). The presence of the proposed well pads would likewise not impact public use in the areas. Additionally, the use of mitigation measures will minimize the impacts and protect the existing ROWs. With standard design features and stipulations, no further analysis is needed.

Table 2.1. Proposed Action Surface Disturbance

Project Feature	Surface Disturbance (acres)	Interim Reclamation (acres)	Final Reclamation (acres)
NAU I01			
Access road and pullout	1.1	-	2.1
Well pad and construction zone	7.9	5.7	2.2
Liquids pipeline	1.0	1.0	-
3 TUPs	0	0	-
Staging area	0	0	-
Total	***10.0***	***6.7***	***4.3***
NAU E01			
Access road and pullouts	2.5	-	2.5
Well pad and construction zone	6.9	4.7	2.2
Liquids pipeline	2.3	2.3	-
Staging area	1.4	1.4	-
3 TUPs	0.4	0.4	-
Total	***13.5***	***8.8***	***4.7***
BTWU G34			
Access road and pullouts	8.3	-	8.3
Well pad and construction zone	6.9	4.7	2.2
Gas pipeline	5.0	5.0	-
Liquids pipeline	3.3	3.3	-
Staging area	1.3	1.3	-
2 TUPs	0.2	0.2	-
Total	***25.0***	***14.5***	***10.5***
BTWU E35			
Access road and pullouts	<0.1	-	<0.1
Well pad and construction zone	6.9	4.2	2.2
Gas pipeline	0	0	-
Liquids pipeline	0	0	-
Staging area	0	0	-
2 TUPs	0	0	-

Project Feature	Surface Disturbance (acres)	Interim Reclamation (acres)	Final Reclamation (acres)
Total	***6.9***	***4.2***	***2.2***
BTWU A35			
Access road and pullouts	1.8	-	1.8
Well pad and construction zone	6.6	4.4	2.2
Gas pipeline	1.1	1.1	-
Liquids pipeline	0	0	-
Staging area	0	0	-
2 TUPs	0	0	-
Total	***9.5***	***5.5***	***4.0***
Proposed Action Total	***64.9***	***39.7***	***25.2***

Table 5.1. Design Values for Counties within the Analysis Area

Pollutant	2019 Design Concentrations	Averaging Time	NAAQS	NMAAQS [a,b]
O_3	Rio Arriba County: 0.067 ppm Sandoval County: 0.068 ppm San Juan County: 0.070 ppm: three stations; Bloomfield at 0.069 ppm, Navajo Dam at 0.070 ppm, Shiprock at 0.069 ppm	8-hour	0.070 ppm [a]	–
NO_2	San Juan County: three stations; Bloomfield at 10 ppb, Navajo Dam at 6 ppb, Shiprock at 3 ppb	Annual	53 ppb [b]	50 ppb
NO_2	San Juan County: Bloomfield at 34 ppb	1-hour	100 ppb [c]	–
SO_2	San Juan County: 2 ppb	1-hour	75 ppb [c]	–
PM_{10}	San Juan County: Invalid monitor data [e]	24-hour	150 µg/m^3 [d]	–

Source: EPA (2020a)

ppm = parts per million, ppb = parts per billion, µg/m^3 = micrograms per cubic meter

[a] Annual fourth highest daily maximum 8-hour concentration, averaged over 3 years.

[b] Annual mean.

[c] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.

[d] Not to be exceeded more than once per year on average over 3 years.

[e] PM_{10} monitor stations currently show installed locations in the planning area (San Juan County); however, the monitor status of these stations show invalid data and cannot be used to represent design values.

[f] The NMAAQS standard for total suspended particulates, which was used as a comparison with PM_{10} and $PM_{2.5}$, was repealed as of November 30, 2018.

[g] While there are no NAAQS for hydrogen sulfide (H_2S), New Mexico has set a 1-hour standard for H_2S at 0.010 ppm for all areas of the state outside of the area within 5 miles of the Pecos-Permian Air Quality Control Region (BLM 2020f).

Table 5.2. Human-Caused Emissions in the New Mexico Portion of the San Juan Basin

Emissions	Emissions (tons per year)					
	NO_X	CO	VOC	PM_{10}	$PM_{2.5}$	SO_2
2014 NEI—all sources	70,254	166,934	93,762	118,725	18,898	6,603
2014 NEI—petroleum and related industries	25,011	–	66,385	–	–	–
WESTAR-WRAP 2014 oil and gas sources	44,433	–	86,173	–	–	–

Sources: EPA (2014a); Ramboll Environ (2017). Includes data for San Juan, Sandoval, Rio Arriba, and McKinley Counties.

Notes: Values include Tier 1 summaries for each county, including combustion, industrial, on-road/non-road, and miscellaneous sectors. Biogenic sources are not included.

Only precursor pollutants to O_3 formation are compared in this analysis (NO_x and VOCs).

Table 5.3. AQI Summary Data for Number of Days Classified above 100 for the Analysis Area (2008–2018)

County	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
San Juan	3	0	20[a]	18	12	6[b]	0	2	2	6	16
Sandoval	0	0	0	0	0	0	0	0	0	1	12
Rio Arriba	0	0	0	0	0	2	0	0	0	3	3
McKinley	0	0	0	0	0	0	–	–	–	–	–

Source: EPA (2020g)

Note: All AQI values presented are classified as unhealthy for sensitive groups (101–150), unless otherwise indicated. Annual summary data for McKinley County are only available for 2008–2013.

[a] Including 5 unhealthy days (above 150) and 2 very unhealthy days (above 200).

[b] Including 1 unhealthy day (above 150).

Table 5.4. Annual Emissions from Operation of the Well Pad and Wells

	Emissions (tons per year)					
Emissions	**NO_x**	**SO_2**	**CO**	**VOCs**	**PM_{10}**	**$PM_{2.5}$**
Current human-caused emissions (San Juan, Sandoval, Rio Arriba, and McKinley Counties)	70,255	6,603	166,934	93,762	118,725	18,898
Emissions from NAU 2208 and BTWU 2308 cluster oil and natural gas wells (23 wells) [a]	105.16	0.23	191.53	414.00	7.76	7.32
Increase	0.150%	0.003%	0.115%	0.442%	0.007%	0.039%

[a] DJR (2020a). See Appendix I for more details.

Table 5.5. Cumulative Air Emissions from Oil and Gas Development

	Emissions (tons per year)					
	NO_x	**SO_2**	**CO**	**VOC**	**PM_{10}**	**$PM_{2.5}$**
Current human-caused emissions (New Mexico portion of San Juan Basin)	70,255	6,603	166,934	93,762	118,725	18,898
Total annual emissions from the RFD (160 wells/year)	961.60	17.60	408.00	2,456	849.60	131.20
Construction and operations of the NAU 2208 and BTWU 2308 cluster oil wells [b]	105.16	0.23	191.53	414.00	7.76	7.32
Total	1,066.76	17.83	599.53	2,870.00	857.36	138.52
Increase	1.518%	0.270%	0.359%	3.061%	0.722%	0.733%
Contribution of Proposed Action to total annual cumulative impact	9.858%	1.290%	31.947%	14.425%	0.905%	5.284%

[a] The representative well used to calculate emissions is a horizontal oil well. Emissions for vertical wells were not used from this analysis due to current predominance in horizontal technological drilling methods and because presenting horizontal oil wells emissions estimates represents a more conservative summary of emissions, compared with emissions from a vertical well, with the exception of SO_2, which could be four to five times greater in a vertical well scenario. However, SO_2 emissions are still estimated to be within the same magnitude and less than 1 ton per year of SO_2 emissions per well. Because oil wells are the predominant type of well in the FFO area, this analysis assumes that all the developed wells will be oil wells. Gas well emission factors are shown as well for comparison. See Appendix G for additional discussion of emission factors.

[b] DJR (2020a). See Appendix I for more details.

Table 5.6. 2016 Estimated Annual GHG Emissions from Oil and Gas Field Production (Operations)

Annual GHG Emissions	CO_2e (metric tons/year)	U.S. Emissions (%)	New Mexico Oil and Gas Emissions (%)
Total U.S. GHG emissions from all sources	6,511,300,000	100	NA
Total U.S. GHG emissions from oil and gas field production	164,400,000	2.52	NA
Total New Mexico emissions from oil and gas field production	6,794,108	0.10	100.00
Total oil and gas emissions from federal production in New Mexico	3,955,124	0.06	58.21
Federal emissions in San Juan Basin from oil and gas field production (16,139 wells) *	1,678,942	0.03	24.71

* Includes federal mineral development in McKinley, Rio Arriba, Sandoval, and San Juan Counties (BLM 2020f).

Source: BLM (2020f).

Table 5.7. Historical Oil and Gas Production (Downstream/End Use)

Oil and Gas Production	2014	2015	2016	2017	2018
U.S. oil production (Mbbl)	3,196,889	3,442,188	3,232,025	3,413,376	4,011,521
New Mexico oil production (Mbbl)	125,021	147,663	146,389	171,440	248,958
PDO oil production (Mbbl)	62,007	73,344	74,810	76,307	122,032
BLM Mancos Gallup planning area oil production (Mbbl)	5,755	8,457	6,889	5,980	5,089
U.S. gas production (MMcf)	25,889,605	27,065,460	26,592,115	27,291,222	30,438,588
New Mexico gas production (MMcf)	1,140,626	1,151,493	1,139,826	1,196,514	*
BLM Mancos Gallup planning area gas production (MMcf)	245,550	281,713	287,347	293,094	476,405
FFO gas production (MMcf)	664,211	642,211	596,747	464,709	437,926
GHG Emissions					
Total U.S. oil and gas GHG emissions (MMT CO_2e)	2,791.29	2,961.11	2,844.84	2,961.08	-
Total New Mexico oil and gas GHG emissions (MMT CO_2e)	116.17	126.50	125.32	139.19	-
Total PDO oil and gas GHG emissions (MMT CO_2e)	40.10	46.95	47.89	48.85	-
Total BLM Mancos Gallup planning area oil and gas GHG emissions (MMT CO_2e)	38.82	38.78	35.62	28.00	-

Source: BLM (2020f).

Mbbl = thousand barrels of oil

MMcf = million cubic feet

MMT = million metric tons

PDO = Pecos District Office

*=Data total for PDO, FFO includes data from both federal and mixed exploratory land classes.

– = Data not available for 2018 (BLM 2020f).

Table 3.8. Estimated Annual GHG Emissions from Development and Production of the Proposed Action

Annual GHG Emissions	CO_2e (metric tons)	All U.S. Annual Emissions (%)	Annual New Mexico Oil and Gas Production Emissions (%)
Well development (23 oil and natural gas wells, Year 1 only)	12,082	0.00019	0.012
Well field production (operations) (23 wells)	7,470	0.000012	0.007
Total	**19,552**	**0.00030**	**0.019**

Note: Totals calculated using an emissions factor of 525.31 metric tons CO_2e for construction and 324.77 metric tons CO_2e for operations to estimate emissions. Annual emissions from a gas well would be higher (based on 1,021.59 metric tons CO_2e from construction and 93.67 metric tons CO_2e from operation). However, over the 20-year life of a well, total emissions would be higher using oil wells to estimate emissions; therefore, for the sake of consistency and to most conservatively estimate impacts from GHG emissions, emissions from oil wells are used consistently throughout this analysis. Additionally, the historical emissions are estimated based on oil wells since oil wells are the predominant type of well in the FFO planning area, so this is a reasonable assumption.

Table 5.8. Estimated Downstream/End-Use (Indirect) GHG Emissions for the Proposed Action

Proposed Action Product	Emission Factors	Estimated Product Quantity	Estimated Emissions (metric tons CO_2e)
Crude Oil (bbl)	0.43 metric ton CO_2/bbl	50,370,000	21,659,100
Natural Gas (mcf)	0.055 metric ton CO_2/mcf	201,480,000	11,081,400
Total		**–**	**32,740,500**

Source: EPA (2020h)

Table 5.9. Reasonably Foreseeable Coal, Oil, and Gas Production and Consumption GHG Emissions, BLM New Mexico, Oklahoma, Kansas, and Texas

	GHG Emissions (MMT CO_2e per year)				
Category	**New Mexico**	**Oklahoma**	**Kansas**	**Texas**	**NM, OK, KS, TX**
2020 High Scenario					
Federal coal	13.89	1.25	0	0	15.14
Federal oil	25.49	0.33	0.08	0.06	25.95
Federal gas	49.60	0.96	0.29	2.40	53.25
Federal natural gas liquids	6.11	0.09	0.05	0.04	6.29
Total Federal	**95.09**	**2.63**	**0.42**	**2.50**	**100.64**
Federal + non-federal coal	43.12	1.87	0.13	97.46	142.58
Federal + non-federal oil	55.28	56.72	22.10	518.06	652.16
Federal + non-federal gas	83.28	152.16	18.14	694.29	947.87
Federal + non-federal natural gas liquids	12.14	20.09	3.14	84.14	119.51
Total federal and non-federal	**193.82**	**230.84**	**43.51**	**1,393.95**	**1,862.12**
2030 High Scenario					
Federal coal	10.14	0.91	0	0	11.05
Federal oil	25.60	0.33	0.08	0.06	26.07
Federal gas	57.44	1.11	0.34	2.78	61.67
Federal natural gas liquids	6.17	0.09	0.05	0.04	6.35
Total Federal	**99.35**	**2.44**	**0.47**	**2.88**	**105.14**

GHG Emissions (MMT CO_2e per year)					
Category	**New Mexico**	**Oklahoma**	**Kansas**	**Texas**	**NM, OK, KS, TX**
Federal + non-federal coal	31.52	1.37	0.1	71.12	104.11
Federal + non-federal oil	55.51	56.95	22.19	520.20	654.85
Federal + non-federal gas	96.45	176.21	21.02	804.05	1,097.72
Federal + non-federal natural gas liquids	12.25	20.27	3.17	84.88	120.57
Total federal and non-federal	**195.73**	**254.8**	**46.47**	**1,480.25**	**1,977.25**

Note: Totals may not sum exactly due to rounding.

Source: Golder Associates (2017).

Table 5.10. Projected Changes in Climate under Representative Concentration Pathways

RCP Pathway	Near Term		Far Term	
	Temperature (°C)	Precipitation (%)	Temperature (°C)	Precipitation (%)
RCP 2.6	0.78	1.44	0.97	2.27
RCP 4.5	0.85	1.49	1.81	3.51
RCP 8.5	0.98	1.62	3.68	5.89

Table 5.11. AADT, Crash Data, and Vehicle Trends for Proposed Route

Route	Distance (miles)	2019 NMDOT AADT Trend	2019 Estimate of Vehicle Trends per NPS Visitor Data*	Number of Accidents	Type of Road
U.S. 550	39.0	8,357	N/A	46	four-lane paved state highway
San Juan CR 7900	21.0	N/A	11,520	N/A	two-lane paved roadway for 8 miles, then dirt road for 13 miles to Chaco Culture NHP entrance
Total	**44.1**	**8,357**	**11,520**	**46**	-

* Chaco Culture NHP 2019 annual reported visitors 47,342; from 1993 to 2004, an average of 74% visitors accessed the Chaco Culture NHP north entrance via CR 7900. Therefore, 35,560 visitors (73% of 47,342) in 2019 used CR 7900 to visit the park; assuming three people per vehicle, 11,520 vehicles traveled CR 7900 in 2019, equating to 32 vehicles per day (11,520 divided by 365).

N/A = Data are not available

Sources: HIFLD (2020); New Mexico Department of Information Technology (2020); NMDOT (2019a, 2019b); NPS (2020a, 2020b).

Table 5.12. 2019 NMDOT AADT and AADT Truck Trends and NPS Estimated Visitor Data and Associated Accidents for Proposed Route

Route	2019 AADT Trend	2019 AADT Truck Trend	2019 Estimate of Vehicle Trends per NPS Visitor Data*	Vehicles Accidents (Other Than Trucks)	Truck Accidents
U.S. 550	8,357	1,577	N/A	41	5
CR 7900	N/A	N/A	11,520	N/A	N/A
Total	**8,357**	**1,577**	**11,520**	**41**	**5**

N/A = data not available

Sources: HIFLD (2020); New Mexico Department of Information Technology (2020); NMDOT (2019a, 2019b); NPS (2020a, 2020b)

Table 5.13. Total Average Daily Round Trips for All Construction Vehicles for the Proposed Project Areas

Project Construction Phase	Duration (days)	Total Number of Round Trips (Heavy Vehicles)	Total Number of Round Trips (Light Vehicles)	Average Daily Round Trips (Heavy Vehicles)	Average Daily Round Trips (Light Vehicles)	Total Average Daily Round Trips (All Vehicles)
Construction	12	4	24	0.25	2.00	2
Drilling	12	203	151	16.92	12.58	30
Completions	10	97	171	9.70	17.10	27
Flow testing	15	407	82	27.13	5.47	33
Pipeline connect	12	24	156	2.00	13.00	15
Reclamation	30	41	216	N/A	N/A	9

Source: Construction duration and total number of round trips provided by DJR (2020c).

Heavy vehicles are considered greater than 26,001 pounds of gross vehicle weight. Light vehicles are less than 19,501 pounds of gross vehicle weight.

N/A = data not available

Table 5.14. Average Daily Well Pad Visits by DJR Operational Staff

Month	Total Vehicle Visits per 30 Days	Average Daily Vehicle Visit
First month	73	2.4
Second month	63	2.1
Third month	48	1.6
Fourth month	39	1.3
Fifth month	34	1.1
Sixth month	30	1.0

Source: DJR (2020c).

Table 5.16. Potential Impacts of the Proposed Action to Quality of Life Values

Quality of Life Value	Potential Impact to Quality of Life
Air Emissions	Localized temporary impacts from construction, particularly dust, lasting an average of 3 to 4 months per proposed project. Quality of life may be temporarily affected by the presence of increased dust or other emissions during construction dependent on the proximity of residences to future potential development as well as atmospheric conditions such as wind speed and direction. Emissions would be minimized through application of air resource protection design features (see Appendix H - Design Features). As such, construction associated with the Proposed Action is unlikely to contribute to a violation of air quality regulations. In addition, the Proposed Action would result in annual increased criteria pollutant emissions from the exhaust emissions from equipment, compressor engines, generators, and flares; and VOCs resulting from oil storage activities (see Table 3.4 in Section 3.1.3). The emissions from the operation of well pads and wells would result in a 0.150% increase in NO_x, 0.003% increase in SO_2, 0.115% increase in CO, 0.442% increase in VOCs, 0.007% increase in PM_{10}, and 0.039% increase in $PM_{2.5}$. The majority of operational emissions associated with the Proposed Action would be minimized through design features provided in Appendix H.

Quality of Life Value	Potential Impact to Quality of Life
Groundwater Quantity and Quality	Total potential groundwater use would comprise less than 0.02% of the 2015 San Juan Basin total water use and 0.3% of 2015 San Juan Basin total groundwater use. Drilling fluids would be recycled and transferred to other permitted closed-loop systems or returned to the vendor for reuse until DJR's gathering systems are in place and eventually will be transported via pipeline to the liquids facilities. Residual and flowback water would be recycled or disposed of at a waste disposal facility Any spills of non-freshwater fluids would be immediately cleaned up and removed to an approved disposal site. DJR will also notify the BLM within 24 hours of any reportable spill. Should a spill occur, the BLM would work with the NMOCD to immediately remediate spills on BLM land in accordance with federal and state standards, including 19.15.29.11 NMAC (see Section 3.3.3). See also the associated SUPOs on file with the BLM FFO for more information regarding DJR's closed-loop systems. There have not been any documented past instances of groundwater contamination in the analysis area attributed to well drilling (BLM 2020h). Due to DJR's adherence to the NMOCD's casing, cementing, and pressure-testing requirements to prevent contamination of aquifers, it is anticipated that the proposed wells would not impact water quality. Should a spill occur, the BLM would work with the NMOCD to immediately remediate spills on BLM land in accordance with federal and state standards, including 19.15.29.11 NMAC.
Traffic Safety	The Proposed Action would result in increased truck traffic on the U.S. 550 corridor and San Juan CR 7900. The proposed projects may be constructed sequentially, and there would be approximately two to 33 daily roundtrips for heavy and light vehicles, which would be a moderate increase of traffic per day during the construction of each of the proposed projects on San Juan CR 7900. There would be a negligible increase of vehicles on the U.S. 550 corridor. If the Proposed Action were to be constructed concurrently, there would be approximately 10 to 165 daily roundtrips on U.S. 550 and San Juan CR 7900. See Section 3.4 for additional detail on traffic impacts.
Noise	Noise from construction activities, including well drilling/completion, pipeline installation, and access road construction may affect residences located within the analysis area by increasing background (ambient) noise levels. Although the ambient noise level within the analysis area has not been measured, the outdoor 24-hour average noise level (Ldn) in a rural residential area is approximately 40 dBA (EPA 1978). The residences nearest the proposed project areas range from approximately 0.25 mile north to 1.4 miles southeast. The nearest residence is located 0.25 mile north of BTWU E35 at a lower elevation, at the bottom of the cliff. The nearest residence to the BTWU G34 is approximately 0.4 mile east. The nearest residence to NAU I01 is approximately 0.9 mile south, and the nearest residence to NAU E01 is approximately 1.4 miles southeast. The rate of noise attenuation follows the inverse square law, or that noise attenuates at roughly 6 decibels (dB) as the distance doubles, beginning at 50 feet from the source (BLM 2020e). Based on the rate of noise attenuation and the approximate noise level emanating from construction associated with oil and gas activities, the predicted noise from construction activities from 500 feet to 7,920 feet would range from 65 dBA to 41 dBA, respectively (BLM 2020e). During most construction phases, the proposed projects are expected to temporarily increase daytime noise levels; however, the drilling and completion phases would potentially generate noise 24 hours per day until that phase is complete. Construction noise levels would increase from 40 dBA to a range of 55 to 68 dBA depending on the location of the sensitive noise receptor (BLM 2020e). In combination with ambient noise levels, the noise levels are expected to drop to approximately 43 dBA during the operations phase of the Proposed Action (BLM 2020e). Additional detailed analysis can be found in a recently permitted cluster project EA (DOI-BLM-NM-F010-2020-0029-EA) in close proximity to the Proposed Action and is incorporated herein by reference (BLM 2020e).

Quality of Life Value	Potential Impact to Quality of Life
Scenic Quality	There are 45 residences within 0.75 mile east and west of CR 7900 from the U.S. 550 intersection south for approximately 8 miles and within a 3-mile radius of the Proposed Action (HIFLD 2020). The nearest residences to the Proposed Action range from approximately 0.25 mile north to 1.4 miles southeast. The nearest residence, located 0.25 mile north of BTWU E35, would not be visually impacted as the residence sits at the bottom of a cliff, out of view of the proposed well. The nearest residence to BTWU G34 is approximately 0.4 mile east; construction traffic will not access the road associated with the residence. The nearest structure to BTWU A35 is located 0.1 mile north and is a barn, not a residence. The nearest residence to NAU I01 is approximately 0.9 mile south and will not be visible. The nearest residence to the NAU E01 is approximately 1.4 mile southeast and will not be visible. Visual impacts from the Proposed Action would include moderate to weak contrast to undeveloped landscapes from well pads and associated infrastructure and the removal of vegetation. The proposed projects would meet Visual Resource Management (VRM) Class III objectives while in operation, which would partially retain the existing character of the undeveloped landscape and may attract attention but would not dominate the view of the casual observer. DJR would follow BLM prescriptions to reduce visual impact by painting all well pad infrastructure and production equipment covert green, which would minimize impacts to the viewshed and scenic quality.
Light Pollution	Light-emitting sources associated with the construction phase of the proposed projects include lights around the working area, lights on the drilling rig (which may include lights on the derrick), vehicle traffic, and flaring. These light sources would be temporary in nature and sporadically used. Night lighting would only be used during the 24-hour construction days during well completion, would last 1 to 2 weeks per well, and would be shielded or turned to the ground whenever possible. Flaring at night would be limited to only days and times necessary for project completion. The necessity and duration for flaring varies from well to well and is difficult to predict. During operations, lighting would be limited to only that needed to conduct work safely.

Table 5.17. Population, Percent Minority, Percent Native American, Income Levels, and Poverty Data for Areas near the Proposed Action

Location	Population	Minority (%)	Native American (%)	Per Capita Income ($)	Median Household Income ($)	Poverty Rate Per Capita Income (%)
Nageezi	261	100	94	5,740	15,375	78
Nageezi Chapter	973	100	98	9,814	21,313	48
Counselor	508	100	91	N/A	21,964	N/A
Counselor Chapter	429	100	N/A	N/A	20,000	N/A
Sandoval County	146,748	62	14	29,255	63,802	10
San Juan County	125,043	62	39	22,067	44,841	24
New Mexico	2,081,015	62	9	22,146	46,748	20

N/A = Data not available

Sources: Counselor Chapter (2020), Data USA (2014), U.S. Census Bureau (2019)

Table 5.18. Summary of Conclusions from Issues Analyzed in Detail

Issue Analyzed in Detail	Summary of Impacts	Are potential impacts disproportionate to EJ populations?
Issue 1: Air Quality	An overall 0.756% increase in NAAQS and VOC emissions as a result of the Proposed Action; localized temporary impacts from construction, particularly dust, lasting an average of 3 to 4 months per proposed project.	Yes. Short-term fugitive dust ($PM_{2.5}$ or PM_{10}) during construction may be felt more by the residents in close proximity to future potential development. These residents are considered to be EJ populations. The design features provided in Appendix H and project-specific COAs would help to minimize potential effects that could be adverse and disproportionate. Overall air quality is a regional resource; thus, any adverse impacts to NAAQS would not be disproportionate to EJ populations in the region.
Issue 2: Greenhouse Gas and Climate Change	All GHG emissions would contribute to global GHG emissions. The Proposed Action is estimated to result in 19,552 MMT CO_2e from construction and operation and 32,740,500 MMT CO_2e from downstream GHG emissions. GHG emissions are associated with documented ongoing and reasonably foreseeable climate-related effects that may affect quality of life. For the San Juan Basin (southern Colorado to south-central New Mexico), these may include increased temperatures, decreases in overall water availability, and increases in frequency, intensity, and duration of both droughts and floods (BLM 2020f). However, the incremental contribution to global GHGs from the Proposed Action cannot be translated into any specific impact on climate change globally or regionally.	No. Any increase in GHG emissions that could impact climate change as described in the analysis would be regional or global in nature and would not be disproportionately borne by EJ populations in the region.
Issue 3: Water Quantity and Quality	6.44 AF per proposed well are anticipated for use in potential future development. The estimated water use would comprise less than 0.03% of the 2015 San Juan Basin total water use, 0.3% of 2015 San Juan Basin total groundwater use, and would result in a 1.3% increase over 2015 water use in the mining category for the San Juan Basin. With consideration of design features and regulatory requirements, no impacts to groundwater or surface water quality are expected from well drilling and completion. Spills could occur that could affect groundwater or surface waters.	Yes. While groundwater resources are regional in nature and water withdrawal is not anticipated to affect domestic water sources, any potential impacts on local water wells (for example, a spill that affects groundwater) could force residents to find other means of supplying water for domestic use. These residents are EJ populations. Design features and COAs would help to minimize this risk. Should a spill occur, the BLM and DJR would work with the NMOCD and/or the Navajo Nation Environmental Protection Agency to immediately remediate spills in accordance with federal and state standards, including 19.15.29.11 NMAC and the Navajo Nation Clean Water Act 104(a)(2)(C), 4 Navajo Nation Code 1304(A)(2)(c) (Navajo Nation 2014).
Issue 4: Traffic and Safety	Approximately two to 33 daily roundtrips for heavy and light vehicles on the U.S. 550 corridor and San Juan CR 7900 during construction of the proposed projects. This would result in a negligible increase along the U.S. 550 corridor but would have a moderate increase on San Juan CR 7900. If the Proposed Action were to be constructed concurrently, there would be approximately 10 to 165 daily roundtrips on U.S. 550 and San Juan CR 7900.	Yes. Any impacts associated with truck traffic and safety on U.S. 550 would be regional in nature, and impacts would not be disproportionate to EJ populations in the region. However, the increase in truck traffic on San Juan CR 7900 would be localized to the access roads utilized by the Nageezi community and visitors to Chaco Culture NHP. Therefore, there is the potential for the Proposed Action to disproportionately impact traffic congestion and risk of incident for EJ populations and visitors to the area along San Juan CR 7900. The design features provided in Appendix H and project-specific COAs would help to minimize potential effects that could be adverse.

Issue Analyzed in Detail	Summary of Impacts	Are potential impacts disproportionate to EJ populations?
Issue 5: Quality of Life	Potential for localized air, noise, visual resources, and traffic and safety impacts that could affect quality of life, particularly during construction. There are 45 residences within 0.75 mile east and west of CR 7900 from the U.S. 550 intersection south for approximately 8 miles and within a 3-mile radius of the Proposed Action (HIFLD 2020). Continued expansion of the oil and gas industry may be perceived as having a negative effect on quality of life for people who value undeveloped landscapes.	Yes. In general, quality of life values could be impacted during construction and operation and would be greater for the residents in close proximity to the Proposed Action. The residences nearest the proposed project areas range from approximately 0.25 mile north to 1.4 miles southeast. Any impacts associated with noise would be greater for the residents in close proximity to the proposed projects. Visual impacts associated with construction and operation of the proposed projects would create visual impacts that are greater for the residents that are within the viewshed of the Proposed Action. Impacts associated with light-emitting sources during construction and operation of the proposed projects would create visual impacts that are greater for the residents that are within the viewshed of the Proposed Action. These residents are identified EJ populations. Design features outlined in Appendix H and project-specific COAs would be applied to reduce effects that could be adverse and disproportionate to the EJ population.

Table 4.1 Pueblos and Tribes Who Received Consultation Requests from the BLM FFO

Tribe	Name
All Pueblos Council of Governors	Governors
Eight Northern Indian Pueblos Council	Governors
Five Sandoval Indian Pueblos	Governors
Jicarilla Apache Tribal Council	President Darrell Paiz
Kewa Pueblo (Pueblo of Santo Domingo)	Governor Thomas Moquino, Jr
Nageezi Chapter House	President Ervin Chavez
Navajo Nation	President Jonathan Nez
Ohkay Owingeh	Governor Ron Lovato
Pueblo of Acoma	Governor Brian Vallo
Pueblo of Cochiti	Governor Charles Naranjo
Pueblo of Isleta	Governor Max Zuni
Pueblo of Isleta, Tribal Historic Preservation Office	Dr. Henry Walt
Pueblo of Jemez	Governor David Toledo
Pueblo of Laguna	Governor Wilfred Herrera, Jr.
Pueblo of Nambe	Governor Phillip A. Perez
Pueblo of Nambe, Tribal Historic Preservation Office	Lt. Governor Arnold J. Garcia
Pueblo of Picuris	Governor Craig Quanchello
Pueblo of Pojoaque	Governor Joseph M. Talachy
Pueblo of San Felipe	Governor Anthony Ortiz
Pueblo of San Felipe Department of Natural Resources	Pinu'u Stout, Director
Pueblo of San Ildefonso	Governor Perry Martinez

Tribe	Name
Pueblo of Sandia	Governor Lawrence Montoya
Pueblo of Santa Ana	Governor Timothy Menchego
Pueblo of Santa Ana Tribal Historic Preservation Office	Director Timothy Menchego
Pueblo of Santa Clara	Governor J. Michael Chavarria
Pueblo of Taos	Governor Edward Concha
Pueblo of Tesuque	Governor Robert Mora, Sr
Pueblo of Zia	Governor Fredrick Medina
Pueblo of Zuni	Governor Val R. Panteah, Sr.
Southern Ute Indian Tribe	Chairwoman Christine Baker-Sage
Ten Southern Pueblo Governor's Council	David Toledo, Chair
The Hope Tribe	Chairman Timothy L. Nuvangyaoma
Ute Mountain Ute Tribe	Chairman Manuel Hart

Appendix G. National Environmental Policy Act Interdisciplinary Team Checklist

INTERDISCIPLINARY (ID) TEAM CHECKLIST

Farmington Field Office

(EAs & DNAs) - The purpose of this checklist is to document which resource issues need analysis in the NEPA document and to identify the ID team for the NEPA document. Responsible staff will make an initial determination and provide rationale for that determination, which is subject to manager review and concurrence. If warranted, issues or determinations may be changed during the NEPA process (e.g., after external scoping, during review, etc.), but changes must be documented and have Authorized Officer concurrence. All elements need a determination, assigned specialist, rationale, initials, and date. The ID team will include all specialists with a "PI" in the table below, and resources with a "PI" will be addressed in Ch. 3 of the EA.

(CXs) - The purpose of this checklist is to identify the ID team for the categorical exclusion (CX). The ID team will help the project lead develop mitigation measures and determine if extraordinary circumstances apply. DO NOT enter a determination, initials, or date for CX projects. Specialists may provide mitigation measures or extraordinary circumstances in the "Rationale for Determination" column, but it is not necessary at this time.

Project Title: G34-2308; E35-2308; A35-2308; E01-2208; I01-2208
NEPA Number: DOI-BLM-NM-F010-2021-0023-EA

File/Serial Number: IT4RM F010-2020-0058-EA

Project Leader: Gary Smith

DETERMINATION OF STAFF: ***(Choose one of the following abbreviated options for the left column)***

PI = Present with potential for relevant impacts that need to be analyzed in Ch. 3 in the EA.
NP = Not present in the area impacted by the proposed or alternative actions
NI = Present, but not impacted to a degree that analysis is required in Ch. 3 in the EA.
NC = (DNAs only) Actions and impacts not changed from those disclosed in the existing NEPA documents cited in Section D of the DNA form. The Rationale column may include NI and NP discussions.

Determination	Resource	Assigned Specialist (X)	Rationale for Determination[1]	Initials[2]	Date[3]
RESOURCES AND ISSUES CONSIDERED (INCLUDES SUPPLEMENTAL AUTHORITIES APPENDIX 1 H-1790-1)					
PI	Air Quality/	(x) W. Thomas ( ) J. Tafoya	How would air quality (particularly with respect to the National Ambient Air Quality Standards [NAAQS]) and volatile organic compounds (VOCs) in the BLM FFO be affected by emissions generated as a result of development associated with the Proposed Action?	WT	10/19/2020
PI	Greenhouse Gas Emissions	(x) W. Thomas ( ) J. Tafoya	How would the future potential development of the proposed action contribute to Greenhouse gas (GHG) emissions?	WT	10/19/2020
NI	Cultural Resources	(x) K. Adams ( ) E. Simpson ( ) G. Haynes	Four Class III Archaeological Surveys (NMCRIS No. 146574; BLM Report No. 2021(I)002F, & NMCRIS No. 146998; BLM Report No. 2021(I)002.1F, NMCRIS No. 145984; BLM Report No.2020(III)014F, NMCRIS No. 145985; BLM Report No. 2020(IV)001F) were conducted in the proposed project areas and during these surveys eight cultural sites (LA178234, LA82880, LA82881, LA197578, LA197579, LA197580, LA197581, & LA197582) were discovered. Two sites (LA82880, & LA178234) were determined to be Eligible for listing on the NRHP, three sites (LA82881, LA197578, & LA197580) were determined to be Not Eligible for listng, and three sites (LA197579, LA197581, & LA197582) were given an Undetermined eligibility status. The sites that were given an Eligible and Undetermined eligibility status will require protective fencing and the presence of an archaeological monitor. With adherence to these stipulations, the proposed project will have no effect to Historic Properties.	KA	12/17/2020
NP	Native American Religious and other Concerns	(x) K. Adams ( ) E. Simpson ( ) G. Haynes	No known TCPs or sensitive cultural areas are present in the proposed project area.	KA	12/17/2020
NI	Paleontology	( ) S. Landon (x) C. Wenman	The Proposed Action is not located within a Paleontological SDA identified by the 2003 BLM FFO RMP, but is located in a	CW	11/20/2020

INTERDISCIPLINARY (ID) TEAM CHECKLIST

Farmington Field Office

Determ-ination	Resource	Assigned Specialist (X)	Rationale for Determination[1]	Initials[2]	Date[3]
			PFYC 5 area. However, based on two desktop reviews provided by SWCA (one for the N Alamito Unit E01 and I01-2208 pads; one for the Betonnie Tsosie Wash Unit G34, E35, and A35-2308 pads), the surface deposits in the project area consists of Pleistocene gravelly sand or extensively re-worked Nacimiento deposits that are unlikely to contain paleo resources. Nearby deposits of Pleistocene gravelly sand and reworked Nacimiento do not contain any known paleo resource occurrences. Based on this information, the potential for paleo findings is low. The following language as a design feature or COA would minimize risk in case of accidental discovery: "Any paleontological resource discovered by the Operator, or any person working on his behalf, on public or Federal land shall be immediately reported to the Authorized Officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery will be made by the Authorized Officer to determine appropriate actions to prevent the loss of significant scientific values. The Holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the Authorized Officer after consulting with the Holder."		
NP	Areas of Critical Environmental Concern	( ) S. Allison ( ) D. McKim (X) Project Lead	No ACEC in project area.	GS	10/21/20
NP	Wilderness	(X) S. Allison ( ) D. McKim	The proposed project does not occur within or adjacent to either the Bisti/De-Na-Zin or Ah-shi-sle-pah Wilderness.	SA	10/21/2020
NI	Visual Resources	(X) S. Allison ( ) D. McKim	The proposed project is located in an area that has been designated as Visual Resource Management (VRM) Classification III. The goal of VRM Class III is to limit the contrast from a project to no more than moderate. This can be accomplished by performing a Visual Contrast Rating Worksheet to evaluate the visual contrast created by the proposed project along with following VRM best management practices and painting infrastructure the appropriate BLM environmental color.	SA	10/21/2020
NI	Recreation	( ) R.Joyner (X) S. Allison	There are no Special or Extensive Recreation Management Areas within the project area. Dispersed recreation takes place in the region, but will not be impacted by this project	SA	10/21/2020
NP	Fuels/Fire Management	(x) J. Tafoya	The nature and scale of the project will not impact Fuels or Fire Management resources.	RJ JT	11/23/2020 9/8/2020
NP	Geology	(x) C. Wenman	The proposed project area does not contain geologic resources managed by the BLM FFO under the 2003 FFO RMP that would be impacted by the proposed project.	CW	11/20/2020
NP	Solid Mineral Resources	(x) C. Wenman	No solid mineral resources or mining operations exist within the proposed project area.	CW	11/20/2020
NI	Oil and Gas / Energy Production	(x) G.Smith ( ) M. Wirth ( ) C. Wenman	Depending on the success of oil and gas well drilling, non-renewable natural gas and/or oil would be extracted and delivered to market. Production of oil or gas would result in the irretrievable loss of these resources (i.e., they would no longer be available for future development). The 2003 Farmington RMP committed these resources for oil and gas development.	GS	10/21/20

Project Title:

INTERDISCIPLINARY (ID) TEAM CHECKLIST

Farmington Field Office

Determ-ination	Resource	Assigned Specialist (X)	Rationale for Determination[1]	Initials[2]	Date[3]
NI	Lands/Access	(x) K.Christesen ( ) M. Tilden ( ) T. Faust	Numerous ROW are within the project proposed area. The use of mitigation measures will minimize the impacts and protect the existing ROWs. With standard design features and stipulations, no further analysis is needed.	KC	10/19/2020
NI	Wastes (hazardous or solid)	( ) W. Thomas ( ) A. Gallegos ( ) C. Wenman (x) G. Smith	Project activities would generate waste, including solid and hazardous materials. Typical wastes associated with oil and gas development include produced water, hydrocarbons, and frac fluids among others. Ongoing oil and gas activities include the implementation of measures to reduce or eliminate hazards associated with wastes in compliance with solid and hazardous materials laws and regulations (e.g., implementation of Spill Prevention Control and Countermeasure Plans [SPCC], disposal of wastes at approved facilities, etc.). Implementation of these measures would continue because these measures are required to maintain compliance with the aforementioned laws and regulations	GS	10/21/20
NI	Livestock Grazing	( ) B. Witmore ( ) C. Gould (x) N. Craun ( ) J. Tafoya	The Proposed Action is within the Escavada AMP (06014) allotment. Due to the small size of the Project Area relative to the allotment area, there are no impacts to livestock grazing. Grazing Trend Plot	RJ JNC	11/23/2020 08/20/2020
NI	Public Land Health Standards	( ) B. Witmore ( ) C. Gould (x) N. Craun ( ) J. Tafoya	Impacts to rangeland health from the Proposed Action are expected to be negligible given the acreage of the Project Area within the grazing allotment and watershed. Standard design features and best management practices requiring reclamation will assist in mitigating any impacts.	RJ JNC	11/23/2020 08/20/2020
NI	Invasive Species/ Noxious Weeds	(x) H. Perry	Standard Noxious and Invasive Weed design features and any additional design features included in the Surface Use Plan of Operations and as part of the project design features, fully mitigates impacts, including the potential spread and establishment of noxious or invasive weeds within the project area	HP	10/19/2020
NI	Vegetation Excluding USFWS Designated Species	( ) B. Witmore ( ) C. Gould (x) N. Craun ( ) J. Tafoya	The Project Area is within the Pinyon/Juniper and sagebrush FFO Vegetation Communities. Given the abundance of these vegetation communities within the watershed, there is no impact to the Vegetation resource.	JNC	08/20/2020
NI	Special Status Plant Species and Animal Species (incl. raptors)	(X) J. Kendall	Impacts to p-dogs and burrowing owls from the proposed project are expected to be negligible due to pdog town being inactive in 2020. No individuals are expected to be impacted. A burrowing owl and p-dog survey required for any new ground disturbing activity between 4/1-8/15	JK	10/19/2020
NI	Threatened, Endangered or Candidate Plant and Animal Species	(X) J. Kendall	The proposed project area is not located within suitable or potential habitat, as defined by USFWS; within conformance of 2002 Biological Assessment (and associated 2003 RMP). Indirect impacts are covered under 2002 BA	JK	10/19/2020
NI	Migratory Birds	(X) J. Kendall	25.3 acres of migratory bird nesting habitat primarily in the sagebrush-rabbitbrush open shrubland would be removed under the Proposed Action	JK	10/19/2020

Project Title:

INTERDISCIPLINARY (ID) TEAM CHECKLIST

Farmington Field Office

Determination	Resource	Assigned Specialist (X)	Rationale for Determination[1]	Initials[2]	Date[3]
			Stipulation: Migratory bird nest surveys required for any new ground disturbance exceeding 4.0 acres from May 15-July 31. Any nest found will be buffered and avoided until nesting activities are complete.		
NI	Wildlife	(X) J. Kendall	The proposed project is not located within any designated Wildlife Area. Impacts to forage for terrestrial wildlife are expected to be negligible overall Approximately 25.3 acres of potential habitat will be removed. Fossorial mammals may be impacted during construction activities. Standard design features/BMPs regarding protection of wildlife, will be implemented to mitigate any impacts. With standard design features/BMPs, no further analysis is needed.	JK	10/19/2020
NP	Wildlife-aquatic	(X) J. Kendall	Not within or near any bodies of water that would be impacted from increased sedimentation or other relevant impact by proposed action. No bluelines of concern	JK	10/19/2020
NP	Wetlands/Riparian Zones	(X) J. Kendall	Not within or near riparian SDA that would be impacted from increased sedimentation or other relevant impact by proposed action.	JK	10/19/2020
PI	Water Resources/Quality (drinking/surface/ ground)	(X) W. Thomas	How would future drilling and completion operations associated with the Proposed Action impact groundwater quality and quantity? (differentiate surface water from groundwater use and differentiate potable and non-potable water for all uses.	WT	10/19/2020
NP	Soils	(X) W. Thomas	Fragile soils are not present within the project area.	WT	10/19/2020
NP	Wild Horses and Burros	( ) J. Tafoya ( ) B. Witmore ( ) C. Gould (x) N. Craun	There are no Congressionally designated wild horses within the Project Area.	RJ JNC	11/23/2020 08/20/2020
NI	Socio-Economics	(X) L. Henio	How will socio-economics of the surrounding communities be impacted by this proposed project?	LH	10/19/2020
NI	Environmental Justice	(X) L. Henio	How will the surrounding communities be impacted by this proposed project, where EJ is concerned? Increased road traffic and road conditions will be a great concern by residents. Counselor and Nageezi Chapter residents specifically due to proximity.	LH	10/19/2020

[1] Rationale for Determination is required for all "NIs" and "NPs." Write brief issue statements for "PIs."

[2] The appropriate resource specialist or Authorized Officer or NEPA Coordinator entering the determination should enter their initials. Typically, the assigned specialist should enter initials. If a senior specialist or the Authorized Officer assigns a resource specialist to the NEPA project, the senior specialist or Authorized Officer shall enter their initials in this column after making a determination. If the assigned specialist is making the determination from an off-site location (i.e., state office), the project lead may enter their own initials as long as the determination is documented (i.e., email, conversation record, etc.). DO NOT enter someone else's initials.

[3] The date entered should be the date the determination was made by the assigned specialist, senior specialist, or Authorized Officer.

PROJECT-ASSIGNED SPECIALISTS REVIEW:

Reviewer Title	Initials[4]	Date	Comments

Project Title:

INTERDISCIPLINARY (ID) TEAM CHECKLIST

Farmington Field Office

NEPA Coordinator or Supervisor	RJ	11/23/2020	Good to go for cluster.

[4] Initials in this column indicates that the NEPA Coordinator has reviewed the assigned specialists column and agrees that the specialists that have been assigned or that have entered PIs (for EAs) will be included in the ID Team for the project. This section is typically initialed at the initial project presentation meeting.

INITIAL DETERMINATION REVIEW (*EA or DNA only*):

Reviewer Title	Initials[5]	Date	Comments
NEPA Coordinator or Supervisor			

[5] Initials in this column indicates that the Authorized Officer or NEPA Coordinator has reviewed the completed checklist after the ID Team entered initial determinations, and the project lead may continue the NEPA process. Initials will not be made here for categorical exclusions (CXs).

Project Title:

Appendix H: Design Features

– Design Features –

DJR would adhere to any conditions required by the BLM FFO. Additional project-specific design features will be included as determined during the BLM on-site meeting. DJR has also committed to the following design features and BMPs to lessen impacts to resources. Where applicable, additional details related to the design features may be found in the APD on file at the BLM FFO.

Air Resources

- Areas not required for facilities would be revegetated during interim reclamation.
- Dirt roads would be watered during periods of high use (magnesium chloride, organic-based compounds, and/or polymer compounds could also be used on dirt roads upon approval of the BLM).
- BMPs provided in The Gold Book would be implemented for proposed and existing roads (BLM and U.S. Forest Service 2007).
- Compressor engines 300 horsepower or less used during well production must be rated by the manufacturer as emitting NO_x at 2 grams per horsepower hour or less to comply with the NMED, Air Quality Bureau's guidance.

Water Resources

- To prevent erosion, certain areas surrounding the proposed site would be recontoured during interim reclamation.
- Culverts and silt traps would be installed as appropriate and where determined during the BLM on-site and facility on-site visits.

Wildlife, Migratory Birds, and Special-Status Species

- Any wildlife encountered within the proposed project area would be avoided and allowed to move out of the proposed project area. No wildlife would be intentionally harmed or harassed.
- Wildlife hazards, such as storage tanks, associated with the proposed project would be fenced or covered, as necessary.
- Because the proposed project would disturb more than 4.0 acres of vegetation, migratory breeding bird nesting surveys would be required if construction activities are scheduled to occur during the migratory bird nesting season (May 15–July 31). If an active nest is encountered, it would be avoided (avoidance buffer to be determined by BLM FFO) and left undisturbed until the nest has failed, or nestlings have fledged. If present, an inactive nest could be cleared by a BLM FFO–approved wildlife biologist.
- DJR would notify the BLM and USFWS upon discovery of a dead or injured migratory bird, bald eagle, or golden eagle within or adjacent to the proposed project area. If the BLM becomes aware of such mortality or injury, the BLM will inform DJR. If DJR fails to notify the USFWS of the mortality or injury, the BLM would notify the USFWS. The BLM and the USFWS would then attempt to determine the cause of mortality and identify appropriate mitigation measures to avoid future occurrences.
- Should other special-status species be observed within the proposed project area prior to or during the proposed project, construction would cease, and the BLM FFO would be immediately contacted. The BLM FFO would then evaluate the resource. Should a discovery be evaluated as significant (protected under the Endangered Species Act, etc.), it would be protected in place until mitigation could be developed and implemented according to guidelines set by the BLM FFO.

- According to BLM FFO Instruction Memorandum No. NM-200-2008-001 (BLM 2008b), an updated pre-construction biological survey could be required for the proposed project if vegetation removal would occur more than 1 year following the previous biological survey.

Soil, Upland Vegetation, and Noxious Weeds and Invasive Species

- Reclamation would follow the guidance provided in the *Farmington Field Office Bare Soil Reclamation Procedures* (BLM 2013). These procedures are referenced in DJR's Surface Reclamation Plan.
- During the pre-disturbance on-site meeting with BLM, a suitable vegetation community from the *Farmington Field Office Bare Soil Reclamation Procedures* (BLM 2013) will be selected by the BLM. Plant species will be chosen from the BLM FFO's seed pick list for the selected community.
- A noxious weed inventory utilizing the New Mexico Noxious Weed List (New Mexico Department of Agriculture 2009) and the U.S. Department of Agriculture's (USDA's) Federal Noxious Weed List (Natural Resources Conservation Service 2017; USDA 2010, 2012) will be conducted during the pre-disturbance on-site meeting.
- Identified noxious weeds would be treated prior to new surface disturbance, as determined by the BLM FFO Noxious Weed Coordinator (505-564-7600). A pesticide use proposal (PUP) would be submitted to and approved by the BLM FFO Noxious Weed Coordinator prior to application of any pesticide.
- See the above water resources section for erosion-control features.

Cultural Resources

- All cultural resources stipulations would be followed as indicated in the BLM Cultural Resource Records of Review and the Conditions of Approvals. These stipulations may include, but are not limited to, temporary or permanent fencing or other physical barriers, monitoring of earth-disturbing construction, project area reduction and/or specific construction avoidance zones, and employee education.
- All employees, contractors, and subcontractors would be informed by the project proponent that cultural sites are to be avoided by all personnel, personal vehicles, and company equipment, and that it is illegal to collect, damage, or disturb cultural resources, and that such activities on federal and tribal lands are punishable by criminal and or administrative penalties under the provisions of Archaeological Resources Protection Act (ARPA) (16 USC 470aa–mm).
- In the event of a cultural resource's discovery during construction, construction activities would immediately cease in the immediate vicinity of the discovery, and DJR would immediately notify the archaeological monitor, if present, or the BLM. The BLM would then ensure the site is evaluated. Should a discovery be evaluated as significant (e.g., National Register of Historic Places, Native American Graves Protection and Repatriation Act of 1990, ARPA), it would be protected in place until mitigating measures can be developed and implemented according to guidelines set by the BLM.
- Known sites and sites identified during the pre-construction cultural resources inventory surveys would be avoided.

Paleontological Resources

If any paleontological resources are discovered during activities associated with the proposed project:

- DJR would immediately inform the BLM Authorized Officer.
- Activities in the vicinity of the discovery would be immediately suspended until written authorization to proceed is issued by the BLM Authorized Officer.
- The discovery would be protected from damage or looting.
- The Authorized Officer would ensure evaluation of the discovery as soon as possible.

- Appropriate measures to mitigate adverse effects to significant paleontological resources would be determined by the Authorized Officer after consulting with the operator.

Visual Resources and Dark Skies

- Equipment not subject to safety requirements would be painted a BLM standard environmental color (covert green) to minimize contrast with the surrounding landscape.
- If applicable, during reclamation, stockpiled rocks, if available, would be placed within the reclaimed area for erosion control and/or to discourage off-highway vehicle traffic (if requested by the BLM FFO). Rocks would be placed in a manner that visually blends with the adjacent, undisturbed landscape.
- Lights would be limited to those needed for safety during construction and operations.
- Lighting would be downward-facing or shielded where possible.

Livestock Grazing and Rangeland Health Standards

- Livestock grazing operators in the vicinity of the proposed project area would be contacted prior to construction.
- Safety meetings would be conducted prior to construction to increase awareness of livestock, such as the presence of open range and driving speeds to avoid livestock collisions.
- To the extent feasible, construction activities would not be conducted when livestock are present within the proposed project area.
- If livestock are present during construction, barriers would be placed to ensure that livestock do not come in contact with potential hazards. Barrier examples could include fencing of exposed ditch-type holes, covering of holes when personnel are not present on-site, and containing contaminants, fluid leaks, or hazards that could cause injury to livestock.

Public Health and Safety

- The hauling of equipment and materials on public roads would comply with New Mexico Department of Transportation regulations. Any accidents involving persons or property would be reported to the BLM FFO. DJR would notify the public of potential hazards by posting signage, having flaggers, or using lighted signs, as necessary.
- Worker safety incidents would be reported to the BLM FFO as required under NTL–3A (U.S. Geological Survey 1979). DJR would adhere to company safety policies and Occupational Safety and Health Administration (OSHA) regulations.
- Vehicles would be restricted to proposed and existing disturbance areas.
- The proposed site would have an informational sign, delineating Operator, Legal Description, etc.
- DJR traffic is expected to adhere to all posted speed limits and signs. Drivers would be appropriately licensed and inspected.

Weeds

Farmington Field Office Standard Noxious/Invasive Weeds Design Features and Best Management Practices

Noxious/Invasive Weeds: DJR will inventory the proposed site for the presence of noxious and invasive weeds. Noxious weeds are those listed on the New Mexico Noxious Weed List and USDA's Federal Noxious Weed List. The New Mexico Noxious Weed List or USDA's Noxious Weed List can be updated at any time and should be regularly check for any changes. Invasive species may or may not be listed as noxious weeds but have been identified to likely cause economic or environmental harm or harm to human health. The following noxious weeds have been identified as occurring on land within the

boundaries of the FFO. Numerous invasive species occur in the BLM FFO area, such as Russian thistle (*Salsola* spp.) and field bindweed (*Convolvulus arvensis*).

Russian knapweed (*Centaurea repens*)	Musk thistle (*Carduus nutans*)
Bull thistle (*Cirsium vulgare*)	Canada thistle (*Cirsium arvense*)
Scotch thistle (*Onopordum acanthium)*	Hoary cress (*Cardaria draba*)
Perennial pepperweed (*Lepidium latifolium*)	Halogeton (*Halogeton glomeratus*)
Spotted knapweed (*Centaurea maculosa*)	Dalmation toadflax (*Linaria genistifolia*)
Yellow toadflax (*Linaria vulgaris*)	Camelthorn (*Alhagi pseudalhagi*)
African rue (*Peganum harmala*)	Saltcedar (*Tamarix* spp.)
Diffuse knapweed (*Centaurea diffusa*)	Leafy spurge (*Euphorbia esula*)

a. Any identified weeds will be treated prior to new surface disturbance if determined by the FFO Noxious Weed Coordinator. If a weed management plan is not on file, one will be created. A PUP will be submitted to and approved by the FFO Noxious Weed Coordinator prior to application of pesticide. The FFO Noxious Weed Coordinator (505-564-7600) can provide assistance in the development of the PUP.

b. Vehicles and equipment should be inspected and cleaned prior to coming onto the site. This is especially important for vehicles from out of state or if coming from a weed-infested site.

c. Fill dirt or gravel may be needed for excavation, road construction/repair, or as a surfacing material. If fill dirt or gravel will be required, the source shall be noxious weed free and approved by the FFO Noxious Weed Coordinator.

d. The site shall be monitored for the life of the project for the presence of noxious weeds (includes maintenance and construction activities). If weeds are found, the FFO Noxious Weed Coordinator shall be notified at (505) 564-7600 and provided with a weed management plan and, if necessary, a PUP. The FFO Coordinator can provide assistance developing the weed management plan and/or the PUP.

e. Only pesticides authorized for use on BLM land would be used and applied by a licensed pesticide applicator. The use of pesticides would comply with federal and state laws and used only in accordance with their registered use and limitations. DJR's weed-control contractor would contact the BLM FFO prior to using these chemicals.

   Noxious/invasive weed treatments must be reported to the FFO Noxious Weed Coordinator. A pesticide use report (PUR) is required to report any mechanical, chemical, biological, or cultural treatments used to eradicate and/or control noxious or invasive species. Reporting will be required quarterly and annually or per request from the FFO Noxious Weed Coordinator.

Bare ground vegetation trim-out:

DJR Operating

DJR OPERATING, LLC

BARE GROUND VEGETATION TRIM-OUT DESIGN

ATTACHED TO

SURFACE PLAN OF OPERATIONS

Facility/ Structure	Required Trim-Out Buffer Distance	Pesticide Use for Vegetation Control	Pesticide Use Plan On file with BLM
Well Head	10′	Yes	Yes
Tanks/Containment	10′	Yes	Yes
Gas Lift Compressors	10′	Yes	Yes
Metering Equipment	10′	Yes	Yes
SCC (Smokeless Combustion Chamber	10′	Yes	Yes

a. Pesticide use for trim-out will require a PUP submitted for approval by the FFO Noxious Weed Coordinator. A PUP is required prior to any treatment. Only pesticides authorized for use on BLM land would be used and applied by a licensed pesticide applicator. The use of pesticides would comply with federal and state laws and used only in accordance with their registered uses and limitations. DJR's weed-control contractor would contact the BLM FFO prior to using these chemicals and provide PURs post treatment.

   A PUR is required to report any mechanical, chemical, biological, or cultural treatments used to eradicate, or control vegetation on-site. Reporting will be required quarterly and annually or per request from the FFO Noxious Weed Coordinator.

Appendix I: Preliminary Draft of Emissions Summary Tables

Company Name: DJR Operating, LLC
Field Name: San Juan County
Facility Name: North Alamito Unit I01-2208

Bureau of Land Management Air Quality Emission Summary Sheet

Production Equipment Emission Rate

			NOx		CO		SO2		PM 2.5		PM 10		Total Particulates		VOC		Total HAPs	
Ref No.	Equipment	Note	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
ENG-1 - ENG-3	(3) Caterpillar CG137-12 Compressor Engine		3.62	15.84	7.23	31.69	0.01	0.04	0.24	1.06	0.24	1.06	0.24	1.06	2.53	11.09	0.73	3.19
ENG-4	(1) Caterpillar G3306 Compressor Engine		0.41	1.80	0.82	3.59	0.00	0.00	0.08	0.36	0.08	0.36	0.08	0.36	0.29	1.26	0.08	0.36
VRU-1 - VRU-3	(3) GTA6.3 VRU Engines		0.38	1.68	0.38	1.68	0.00	0.00	0.07	0.16	0.07	0.16	0.07	0.16	0.27	1.18	0.07	0.33
GEN-1 & GEN-2	(2) Capstone C65 Electric Generation Engines		0.05	0.23	0.13	0.59	0.00	0.00	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.05	0.03	0.13
HT-1 - HT-12	(4) 0.75 MMBtu/hr and (8) 0.5 MMBtu/hr Indirect Heaters	a	0.79	3.44	0.66	2.89	0.00	0.02	0.01	0.05	0.03	0.15	0.05	0.20	0.04	0.18	0.00	0.00
VRT-1 - VRT-3	(3) Vapor Recovery Towers	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.38	1.40	0.12	0.03
TK-1 - TK-8	(8) 400 bbl Comingled Liquid Storage Tanks	f	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	4.55	0.15	0.67
FUG-1	Fugitives	c	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.52	28.54	0.17	0.76
ECD-1 - ECD-2	(2) Enclosed Combustion Devices	d	0.05	0.22	0.40	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	2.11	0.00	0.00
P-1	Pneumatics (Liquid Level Controllers & Pump)	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.20	18.37	0.01	0.04
SSM	Startup, Shutdown, Maintenance Emissions		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
Malfunction	Malfunction Emissions		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
	Total		**5.30**	**23.20**	**9.63**	**42.20**	**0.01**	**0.06**	**0.42**	**1.69**	**0.44**	**1.79**	**0.45**	**1.85**	**21.75**	**88.72**	**1.37**	**5.49**

NOTES: a - Burner emissions based on EPA AP-42 emission factors from Section 1.4, Tables 1.4-1 and 1.4-2 for uncontrolled natural gas burners, it is assumed that burners operate 8,760 hours per year, and a fuel heating value of 1168.20 Btu/SCF

b - Vapor Recovery Tower is process equipment that has the VRU taking the gas to sales. The emissions estimate from the VRT accounts for 5% downtime of the VRU for maintenance.

c - Fugitive emissions of VOC/HAP from leaking connectors, valves, tank hatches, and relief vent/valves. Emission Factors from USEPA AP-42 Oil and Gas Production Facilities.

d - ECD emissions account for pilot gas and NOx,CO,and SO2 emissions from all controlled sources. The controlled VOC and HAP emissions have been allocated back to the individual contributing source.

e - Pneumatic VOC/HAP emissions based on VOC/HAP fraction of the field gas, and consumption rates of typical equipment used in this field area.

f - VOC emissions from commingled storage tanks are controlled emissions due to the control device being federally enforceable.

^ - Emissions from Excel Workbook

* - Emissions from Air_Emission_Calc_Tool

Company Name: DJR Operating, LLC
Field Name: San Juan County
Facility Name: North Alamito Unit E01 2208

Bureau of Land Management Air Quality Emission Summary Sheet

Production Equipment Emission Rate

			NOx		CO		SO2		PM 2.5		PM 10		Total Particulates		VOC		Total HAPs	
Ref No.	Equipment	Note	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
ENG-1 - ENG-2	(2) Caterpillar CG137-12 Compressor Engine		2.41	10.56	4.82	21.12	0.01	0.02	0.16	0.71	0.16	0.71	0.16	0.71	1.69	7.39	0.49	2.12
VRU-1 - VRU-2	(2) GTA8.3 VRU Engines		0.38	1.68	0.38	1.68	0.00	0.00	0.03	0.13	0.03	0.13	0.03	0.13	0.27	1.18	0.07	0.33
GEN-1 & GEN-2	(2) Capstone C65 Electric Generation Engines		0.05	0.23	0.13	0.59	0.00	0.00	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.05	0.03	0.13
HT-1 - HT-6	(2) 0.75 MMBtu/hr and (4) 0.5 MMBtu/hr Indirect Heaters	a	0.39	1.72	0.33	1.45	0.00	0.01	0.01	0.02	0.02	0.07	0.02	0.10	0.02	0.09	0.00	0.00
VRT-1 - VRT-2	(2) Vapor Recovery Towers	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.38	1.40	0.12	0.03
TK-1 - TK-4	(4) 400 bbl Comingled Liquid Storage Tanks	f	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	4.55	0.15	0.67
FUG-1	Fugitives	c	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.36	19.10	0.11	0.50
ECD-1	(2) Enclosed Combustion Devices	d	0.05	0.21	0.38	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	2.02	0.00	0.00
P-1	Pneumatics (Liquid Level Controllers & Pump)	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.10	9.19	0.01	0.03
SSM	Startup, Shutdown, Maintenance Emissions		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
Malfunction	Malfunction Emissions		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
	Total		**3.29**	**14.40**	**6.06**	**26.53**	**0.01**	**0.04**	**0.21**	**0.92**	**0.22**	**0.97**	**0.22**	**1.00**	**16.33**	**64.96**	**0.98**	**3.80**

NOTES: a - Burner emissions based on EPA AP-42 emission factors from Section 1.4, Tables 1.4-1 and 1.4-2 for uncontrolled natural gas burners, it is assumed that burners operate 8,760 hours per year, and a fuel heating value of 1168.20 Btu/SCF

b - Vapor Recovery Tower is process equipment that has the VRU taking the gas to sales. The emissions estimate from the VRT accounts for 5% downtime of the VRU for maintenance.

c - Fugitive emissions of VOC/HAP from leaking connectors, valves, tank hatches, and relief vent/valves. Emission Factors from USEPA AP-42 Oil and Gas Production Facilities.

d - ECD emissions account for pilot gas and NOx,CO,and SO2 emissions from all controlled sources. The controlled VOC and HAP emissions have been allocated back to the individual contributing source.

e - Pneumatic VOC/HAP emissions based on VOC/HAP fraction of the field gas, and consumption rates of typical equipment used in this field area.

f - VOC emissions from commingled storage tanks are controlled emissions due to control device being federally enforceable.

^ - Emissions from Excel Workbook

* - Emissions from Air_Emission_Calc_Tool

Company Name: DJR Operating, LLC
Field Name: San Juan County
Facility Name: Betonnie Tsosie Wash Unit G34 2308

Bureau of Land Management Air Quality Emission Summary Sheet

Production Equipment Emission Rate

			NOx		CO		SO2		PM 2.5		PM 10		Total Particulates		VOC		Total HAPs	
Ref No.	Equipment	Note	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
ENG-1 - ENG-3	(3) Caterpillar CG137-12 Compressor Engine		3.62	15.84	7.23	31.69	0.01	0.04	0.24	1.06	0.24	1.06	0.24	1.06	2.53	11.09	0.73	3.19
ENG-4	(1) Caterpillar G3306 Compressor Engine		0.41	1.80	0.82	3.59	0.00	0.00	0.08	0.36	0.08	0.36	0.08	0.36	0.29	1.26	0.08	0.36
VRU-1 - VRU-3	(3) GTA8.3 VRU Engines		0.38	1.68	0.38	1.68	0.00	0.00	0.07	0.16	0.07	0.16	0.07	0.16	0.27	1.18	0.07	0.33
GEN-1 & GEN-2	(2) Capstone C65 Electric Generation Engines		0.05	0.23	0.13	0.59	0.00	0.00	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.05	0.03	0.13
HT-1 - HT-12	(4) 0.75 MMBtu/hr and (8) 0.5 MMBtu/hr Indirect Heaters	a	0.79	3.44	0.66	2.89	0.00	0.02	0.01	0.05	0.03	0.15	0.05	0.20	0.04	0.18	0.00	0.00
VRT-1 - VRT-3	(3) Vapor Recovery Towers	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.38	1.40	0.12	0.03
TK-1 - TK-8	(8) 400 bbl Comingled Liquid Storage Tanks	f	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	4.55	0.15	0.67
FUG-1	Fugitives	c	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.52	28.54	0.17	0.76
ECD-1 - ECD-2	(2) Enclosed Combustion Devices	d	0.05	0.22	0.40	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	2.11	0.00	0.00
P-1	Pneumatics (Liquid Level Controllers & Pump)	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.20	18.37	0.01	0.04
SSM	Startup, Shutdown, Maintenance Emissions		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
Malfunction	Malfunction Emissions		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
	Total		**5.30**	**23.20**	**9.63**	**42.20**	**0.01**	**0.06**	**0.42**	**1.69**	**0.44**	**1.79**	**0.45**	**1.85**	**21.75**	**88.72**	**1.37**	**5.49**

NOTES: a - Burner emissions based on EPA AP-42 emission factors from Section 1.4, Tables 1.4-1 and 1.4-2 for uncontrolled natural gas burners, it is assumed that burners operate 8,760 hours per year, and a fuel heating value of 1168.20 Btu/SCF

b - Vapor Recovery Tower is process equipment that has the VRU taking the gas to sales. The emissions estimate from the VRT accounts for 5% downtime of the VRU for maintenance.

c - Fugitive emissions of VOC/HAP from leaking connectors, valves, tank hatches, and relief vent/valves. Emission Factors from USEPA AP-42 Oil and Gas Production Facilities.

d - ECD emissions account for pilot gas and NOx,CO,and SO2 emissions from all controlled sources. The controlled VOC and HAP emissions have been allocated back to the individual contributing source.

e - Pneumatic VOC/HAP emissions based on VOC/HAP fraction of the field gas, and consumption rates of typical equipment used in this field area.

f - VOC emissions from the commingled storage tanks are controlled emissions due to control device being federally enforceable.

^ - Emissions from Excel Workbook

* - Emissions from Air_Emission_Calc_Tool

Company Name: DJR Operating, LLC
Field Name: San Juan County
Facility Name: Betonnie Tsosie Wash Unit E35 2308

Bureau of Land Management Air Quality Emission Summary Sheet

Production Equipment Emission Rate

			NOx		CO		SO2		PM 2.5		PM 10		Total Particulates		VOC		Total HAPs	
Ref No.	Equipment	Note	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
ENG-1 - ENG-3	(3) Caterpillar CG137-12 Compressor Engine		3.62	15.84	7.23	31.69	0.01	0.04	0.24	1.06	0.24	1.06	0.24	1.06	2.53	11.09	0.73	3.19
ENG-4	(1) Caterpillar G3306 Compressor Engine		0.41	1.80	0.82	3.59	0.00	0.00	0.08	0.36	0.08	0.36	0.08	0.36	0.29	1.26	0.08	0.36
VRU-1 - VRU-3	(3) GTA8.3 VRU Engines		0.38	1.68	0.38	1.68	0.00	0.00	0.07	0.15	0.07	0.15	0.07	0.16	0.27	1.18	0.07	0.33
GEN-1 & GEN-2	(2) Capstone C65 Electric Generation Engines		0.05	0.23	0.13	0.59	0.00	0.00	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.05	0.03	0.13
HT-1 - HT-12	(4) 0.75 MMBtu/hr and (8) 0.5 MMBtu/hr Indirect Heaters	a	0.79	3.44	0.66	2.89	0.00	0.02	0.01	0.05	0.03	0.15	0.05	0.20	0.04	0.18	0.00	0.00
VRT-1 - VRT-3	(3) Vapor Recovery Towers	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.38	1.40	0.12	0.03
TK-1 - TK-8	(8) 400 bbl Comingled Liquid Storage Tanks	f	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	4.55	0.15	0.67
FUG-1	Fugitives	c	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.52	28.54	0.17	0.76
ECD-1 - ECD-2	(2) Enclosed Combustion Devices	d	0.05	0.22	0.40	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	2.11	0.00	0.00
P-1	Pneumatics (Liquid Level Controllers & Pump)	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.20	18.37	0.01	0.04
SSM	Startup, Shutdown, Maintenance Emissions		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
Malfunction	Malfunction Emissions		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
	Total		**5.30**	**23.20**	**9.63**	**42.20**	**0.01**	**0.06**	**0.42**	**1.69**	**0.44**	**1.79**	**0.45**	**1.85**	**21.75**	**88.72**	**1.37**	**5.49**

NOTES: a - Burner emissions based on EPA AP-42 emission factors from Section 1.4, Tables 1.4-1 and 1.4-2 for uncontrolled natural gas burners, it is assumed that burners operate 8,760 hours per year, and a fuel heating value of 1168.20 Btu/SCF

b - Vapor Recovery Tower is process equipment that has the VRU taking the gas to sales. The emissions estimate from the VRT accounts for 5% downtime of the VRU for maintenance.

c - Fugitive emissions of VOC/HAP from leaking connectors, valves, tank hatches, and relief vent/valves. Emission Factors from USEPA AP-42 Oil and Gas Production Facilities.

d - ECD emissions account for pilot gas and NOx,CO,and SO2 emissions from all controlled sources. The controlled VOC and HAP emissions have been allocated back to the individual contributing source.

e - Pneumatic VOC/HAP emissions based on VOC/HAP fraction of the field gas, and consumption rates of typical equipment used in this field area.

f - VOC emissions from the commingled storage tanks are controlled emissions due to control device being federably enforceable.

^ - Emissions from Excel Workbook

* - Emissions from Air_Emission_Calc_Tool

Company Name: DJR Operating, LLC
Field Name: San Juan County
Facility Name: Betonnie Tsosie Wash Unit A35 2308

Bureau of Land Management Air Quality Emission Summary Sheet

Production Equipment Emission Rate

			NOx		CO		SO2		PM 2.5		PM 10		Total Particulates		VOC		Total HAPs	
Ref No.	Equipment	Note	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
ENG-1 - ENG-3	(2) Caterpillar CG137-12 Compressor Engine		3.62	15.84	7.23	31.69	0.01	0.04	0.24	1.06	0.24	1.06	0.24	1.06	2.53	11.09	0.73	3.19
VRU-1 - VRU-3	(2) GTA8.3 VRU Engines		0.38	1.68	0.38	1.68	0.00	0.00	0.07	0.16	0.07	0.16	0.07	0.16	0.27	1.18	0.07	0.33
GEN-1 & GEN-2	(2) Capstone C65 Electric Generation Engines		0.05	0.23	0.13	0.59	0.00	0.00	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.05	0.03	0.13
HT-1 - HT-9	(3) 0.75 MMBtu/hr and (6) 0.5 MMBtu/hr Indirect Heaters	a	0.73	3.20	0.61	2.69	0.00	0.02	0.01	0.05	0.03	0.14	0.04	0.19	0.04	0.17	0.00	0.00
VRT-1 - VRT-2	(2) Vapor Recovery Towers	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.38	1.40	0.12	0.03
TK-1 - TK-6	(6) 400 bbl Comingled Liquid Storage Tanks	f	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	4.55	0.15	0.67
FUG-1	Fugitives	c	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.52	28.54	0.17	0.76
ECD-1 - ECD-2	(2) Enclosed Combustion Devices	d	0.05	0.22	0.40	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	2.11	0.00	0.00
P-1	Pneumatics (Liquid Level Controllers & Pump)	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.15	13.78	0.01	0.02
SSM	Startup, Shutdown, Maintenance Emissions		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
Malfunction	Malfunction Emissions		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
	Total		**4.83**	**21.16**	**8.77**	**38.40**	**0.01**	**0.06**	**0.33**	**1.33**	**0.35**	**1.42**	**0.37**	**1.47**	**20.41**	**82.86**	**1.28**	**5.11**

NOTES: a - Burner emissions based on EPA AP-42 emission factors from Section 1.4, Tables 1.4-1 and 1.4-2 for uncontrolled natural gas burners, it is assumed that burners operate 8,760 hours per year, and a fuel heating value of 1168.20 Btu/SCF
b - Vapor Recovery Tower is process equipment that has the VRU taking the gas to sales. The emissions estimate from the VRT accounts for 5% downtime of the VRU for maintenance.
c - Fugitive emissions of VOC/HAP from leaking connectors, valves, tank hatches, and relief vent/valves. Emission Factors from USEPA AP-42 Oil and Gas Production Facilities.
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e - Pneumatic VOC/HAP emissions based on VOC/HAP fraction of the field gas, and consumption rates of typical equipment used in this field area.
f - VOC emissions from the commingled storage tanks are controlled emissions due to control device being federably enforceable.
^ - Emissions from Excel Workbook
* - Emissions from Air_Emission_Calc_Tool

Appendix J: Phases of Oil and Gas Development

Construction Activities

Clearing of the proposed well pad and access road would be limited to the smallest area possible to provide safe and efficient work areas for all phases of construction. First, all new construction areas need to be cleared of all vegetation. All clearing activities are typically accomplished by cutting, mowing, and/or grading vegetation as necessary. Cut vegetation may be mulched and spread on-site or hauled to a commercial waste disposal facility.

Next, heavy equipment, including but not limited to, bulldozers, graders, front-end loaders, and/or track hoes are used to construct, at a minimum, the pad. Other features, as needed for development, may include, but are not limited to, an access road, reserve pit, pipeline, and/or fracturing pond. Cut and fills may be required to level the pad or road surfaces. If a reserve pit is authorized, it would be lined using an impermeable liner or other lining mechanism (i.e., bentonite or clay) to prevent fluids from leeching into the soil. Access roads may have cattle guards, gates, drainage control, or pull-outs installed, among a host of other features that may be necessary based on the site-specific situation. Long-term surfaces are typically dressed with a layer of crushed rock or soil cemented. Construction materials come from a variety of sources. Areas not needed for long-term development (i.e., portions of the pipeline or road right-of-way [ROW]) are reclaimed by recontouring the surface and establishing vegetation.

If a pipeline is needed, the ROW would be cleared of all vegetation. The pipeline would be laid out within the cleared section. A backhoe, or similar piece of equipment, would dig a trench at least 36 inches below the surface. After the trench is dug, the pipes would be assembled by welding pieces of pipe together and bending them slightly, if necessary, to fit the contour of the pipeline's path. Once inspected, the pipe can be lowered into the trench and covered with stockpiled subsoil that was originally removed from the hole. Each pipeline undergoes hydrostatic testing prior to natural gas being pumped through the pipeline. This ensures the pipeline is strong enough and absent of any leaks.

Drilling Operations

When the pad is complete, the drilling rig and associated equipment would be moved on-site and erected. A conventional rotary drill rig with capability matched to the depth requirements of the proposed well(s) would be used. The well could be drilled as a horizontal well to target the desired formation. The depth of the well is entirely dependent on the target formation depth.

When a conventional reserve pit system is proposed, drilling fluid or mud is circulated through the drill pipe to the bottom of the hole, through the bit, up the bore of the well, and finally to the surface. When mud emerges from the hole, it enters into the reserve pit, where it would remain until all fluids are evaporated and the solids can be buried.

A closed-loop system operates in a similar fashion except that when the mud emerges from the hole, it passes through a series of equipment used to screen and remove drill cuttings (rock chips) and sand-sized solids rather than going into the pit. When the solids have been removed, the mud would be placed into holding tanks, and from the tank, used again.

In either situation the mud is maintained at a specific weight and viscosity to cool the bit, seal off any porous zones (thereby protecting aquifers or preventing damage to producing zone productivity), control subsurface pressure, lubricate the drill string, clean the bottom of the hole, and bring the drill cuttings to the surface. Water-based or oil-based muds can be used and is entirely dependent on the site-specific conditions.

Completion Operations

Once a well has been drilled, completion operations would begin once crews and equipment are available. Well completion involves setting casing to depth and perforating the casing in target zones.

Wells are often treated during completion to improve the recovery of hydrocarbons by increasing the rate and volume of hydrocarbons moving from the natural oil and gas reservoir into the wellbore. These processes are known as well-stimulation treatments, which create new fluid passageways in the producing formation or remove blockages within existing passageways. They include fracturing, acidizing, and other mechanical and chemical treatments often used in combination. The results from different treatments are additive and complement each other.

Hydraulic Fracturing

Hydraulic fracturing is one technological key to economic recovery of oil and gas that might have been left by conventional oil and gas drilling and pumping technology. It is a formation stimulation practice used to create additional permeability in a producing formation, thus allowing gas to flow more readily toward the wellbore. Hydraulic fracturing can be used to overcome natural barriers, such as naturally low permeability or reduced permeability resulting from near wellbore damage, to the flow of fluids (gas or water) to the wellbore (Groundwater Protection Council 2009). The process is not new and has been a method for additional oil and gas recovery since the early 1900s; however, with the advancement of technology, it is more commonly used.

Hydraulic fracturing is a process that uses high-pressure pumps to pump fracturing fluid into a formation at a calculated, predetermined rate and pressure to generate fractures or cracks in the target formation. For shale development, fracture fluids are primarily water-based fluids mixed with additives that help the water to carry proppants into the fractures, which may be made up of sand, walnut hulls, or other small particles of materials. The proppant is needed to "prop" open the fractures once the pumping of fluids has stopped. Once the fracture has initiated, additional fluids are pumped into the wellbore to continue the development of the fracture and to carry the proppant deeper into the formation. The additional fluids are needed to maintain the downhole pressure necessary to accommodate the increasing length of the opened fracture in the formation.

Hydraulic fracturing of horizontal shale gas wells is performed in stages. Lateral lengths in horizontal wells for development may range from 1,000 feet to more than 5,000 feet. Depending on the lengths of the laterals, treatment of wells may be performed by isolating smaller portions of the lateral.
The fracturing of each portion of the lateral wellbore is called a stage. Stages are fractured sequentially beginning with the section at the farthest end of the wellbore, moving uphole as each stage of the treatment is completed until the entire lateral well has been stimulated.

This process increases the flow rate and volume of reservoir fluids that move from the producing formation into the wellbore. The fracturing fluid is typically more than 99% water and sand, with small amounts of readily available chemical additives used to control the chemical and mechanical properties of the water and sand mixture (see Table J.1 below).

Because the fluid is composed mostly of water, large volumes of water are usually needed to perform hydraulic fracturing. However, in some cases, water is recycled or produced water is used.

Chemicals serve many functions in hydraulic fracturing, from limiting the growth of bacteria to preventing corrosion of the well casing. Chemicals are needed to ensure the hydraulic fracturing job is effective and efficient. The fracturing fluids used for shale stimulations consist primarily of water but also include a variety of additives. The number of chemical additives used in a typical fracture treatment

varies depending on the conditions of the specific well being fractured. A typical fracture treatment will use very low concentrations of between three and 12 additive chemicals depending on the characteristics of the water and the shale formation being fractured. Each component serves a specific, engineered purpose. The predominant fluids currently being use for fracture treatments in the shale gas plays are water-based fracturing fluids mixed with friction-reducing additives, also known as slickwater (Groundwater Protection Council 2009).

The make-up of fracturing fluid varies from one geologic basin or formation to another. Because the make-up of each fracturing fluid varies to meet the specific needs of each area, there is no one-size-fits-all formula for the volumes for each additive. In classifying fracture fluids and their additives, it is important to realize that service companies that provide these additives have developed a number of compounds with similar functional properties to be used for the same purpose in different well environments. The difference between additive formulations may be as small as a change in concentration of a specific compound (Groundwater Protection Council 2009).

Typically, the fracturing fluids consist of about 99% water and sand and about 1% chemical additives. The chemical additives are essential to the process of releasing gas trapped in shale rock and other deep underground formations.

Some soils and geologic formations contain low levels of radioactive material. This naturally occurring radioactive material (NORM) emits low levels of radiation, to which everyone is exposed on a daily basis. When NORM is associated with oil and natural gas production, it begins as small amounts of uranium and thorium within the rock. These elements, along with some of their decay elements, notably Radium-226 and Radium-228, can be brought to the surface in drill cuttings and produced water. Radon-222, a gaseous decay element of radium, can come to the surface along with the shale gas. When NORM is brought to the surface, it remains in the rock pieces of the drill cuttings, remains in solution with produced water, or, under certain conditions, precipitates out in scales or sludges. The radiation is weak and cannot penetrate dense materials such as the steel used in pipes and tanks.

Before operators or service companies perform a hydraulic fracturing treatment, a series of tests are performed. These tests are designed to ensure that the well, casing, well equipment, and fracturing equipment are in proper working order and would safely withstand the application of the fracture treatment pressures and pump flow rates.

To ensure that hydraulic fracturing is conducted in a safe and environmentally sound manner, the BLM approves and regulates all drilling and completion operations, and related surface disturbance on federal public land. Operators must submit Applications for Permit to Drill (APDs) to the agency. Prior to approving an APD, a BLM Field Office geologist identifies all potential subsurface formations that would be penetrated by the wellbore. This includes all groundwater aquifers and any zones that would present potential safety or health risks that may need special protection measures during drilling, or that may require specific protective well construction measures.

Once the geologic analysis is completed, the BLM reviews the company's proposed casing and cementing programs to ensure the well construction design is adequate to protect the surface and subsurface environment, including the potential risks identified by the geologist and all known or anticipated zones with potential risks.

During drilling, the BLM is on location during the casing and cementing of the groundwater protective surface casing and other critical casing and cementing intervals. Before hydraulic fracturing takes place, all surface casing and some deeper, intermediate zones are required to be cemented from the bottom of the cased hole to the surface. The cemented well is pressure tested to ensure there are no leaks and a cement bond log is run to ensure the cement has bonded to the casing and the formation. If the fracturing

of the well is considered to be a “non-routine” fracture for the area, the BLM would always be on-site during those operations as well as when abnormal conditions develop during the drilling or completion of a well.

Production Operations

Production equipment used during the life of the well may include a three-phase separator-dehydrator; flowlines; a meter run; tanks for condensate, produced oil, and water; and heater treater. A pump jack may be required if the back pressure of the well is too high. Production facilities are arranged to facilitate safety and maximize reclamation opportunities. All permanent aboveground structures not subject to safety considerations are painted a standard BLM environmental color or as landowner specified.

Workovers may be performed multiple times over the life of the well. Because gas production usually declines over the years, operators perform workover operations which involve cleaning, repairing, and maintaining the well for the purposes of increasing or restoring production.

Anticipated use or produced hazardous materials during the development may come from drilling materials; cementing and plugging materials; hydraulic fracturing materials; production products (natural gas, condensates, produced water); fuels and lubricants; pipeline materials; combustion emissions; and miscellaneous materials. Table J.1 includes some of the common wastes (hazardous and nonhazardous) that are produced during oil and gas development.

Table J.1. Common Wastes Produced during Oil and Gas Development

Phase	Waste	
Construction	Domestic wastes (e.g., food scraps, paper, etc.)	
	Excess construction materials	Woody debris
	Used lubricating oils	Paints
	Solvents	Sewage
	Drilling muds, including additives (i.e., chromate and barite) and cuttings Well drilling, completion, workover, and stimulation fluids (i.e., oil derivatives such as polycyclic aromatic hydrocarbons [PAHs], spilled chemicals, suspended and dissolved solids, phenols, cadmium, chromium, copper, lead, mercury, nickel)	
	Equipment, power unit and transport maintenance wastes (i.e., batteries, used filters, lubricants, oil, tires, hoses, hydraulic fluids, paints, solvents)	
	Fuel and chemical storage drums and containers	
	Cementing wastes	Rigwash
	Production testing wastes	Excess drilling chemicals
	Excess construction materials	Processed water
	Scrap metal	Contaminated soil
	Sewage	Domestic wastes
Hydraulic Fracturing	See below	
Production	Power unit and transport maintenance wastes (i.e., batteries, used filters, lubricants, filters, tires, hoses, coolants, antifreeze, paints, solvents, used parts)	
	Discharged produced water	
	Production chemicals	
	Workover wastes (e.g., brines)	
Abandonment / Reclamation	Construction materials	
	Decommissioned equipment	
	Contaminated soil	

Literature Cited

Groundwater Protection Council. 2009. *Modern Shale Gas Development in the United States: A Primer*. Prepared for the U.S. Department of Energy, Office of Fossil Energy, and National Energy Technology Laboratory (NETL). DE-FG26-04NT15455. Oklahoma City, Oklahoma. Available at: https://energy.gov/fe/downloads/modern-shale-gas-development-united-states-primer.

Appendix K: Visual Contrast Rating Worksheets

Form 8400-4
(June 2018)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 10/26/2020
District Office: BLM FFO
Field Office: Farmington
Land Use Planning Area: Oil and Natural Gas Well

SECTION A. PROJECT INFORMATION

1. Project Name DJR NAU E01 - I01 Well Pads	4. KOP Location (T.R.S) Section 02, T. 22N., R. 8W.	5. Location Sketch
2. Key Observation Point (KOP) Name KOP 1		
3. VRM Class at Project Location Class III	(Lat. Long) 36°10'29.16"N, 107°38'33.79"W	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain throughout the entire project area.	Clear uniformity in background and mid-ground. Patchy blocks from shrubs in foreground.	Structures in the background are partially prominent. Road dominates from the foreground to backgorund
LINE	Horizontal, small undulation on the horizon	Uniform throughout foreground, mid-ground, and background	Small vertical lines on horizon. Defined vertical line for road.
COLOR	Light brown, yellow-tan, and white	Light tans, darker browns, slate-grays, dark greens,	White, tan for road. Pale green, tan for CLF pad.
TEX-TURE	Coarse mid and foreground, smooth background	Coarse mid and foreground, smooth background.	Smooth for road, prominent for CLF facility.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat forms from the the pad construction	Short, smooth, undulating lines from temporary disturbance, construction, reclamation and contouring in foreground	Block-like forms from completion of tanks within VRM; upright forms during construction
LINE	Near horizontal from temp disturbance for pad construction and flat horizontal lines post construction.	Straight bladed lines from workspace edges and clear, flat lines were vegetation is removed	Background vertical lines on horizon.
COLOR	Some tan/white and gray colors expected from the ground disturbance	Areas of lighter and brighter green where reclamation would occur	Tan and gray colors expected from the disturbance and pad construction.
TEX-TURE	Smooth where disturbance has occurred	Smooth from temporary disturbance and jagged from reclaimed vegetation growth.	Smooth and uniform.

SECTION D. CONTRAST RATING ___SHORT TERM ✓LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			✓				✓				✓	
	LINE			✓				✓				✓	
	COLOR			✓				✓				✓	
	TEXTURE			✓				✓				✓	

2. Does project design meet visual resource management objectives? ✓Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes ✓No (Explain on reverses side)

Evaluator's Names — Date
SWCA Environmental Consultants — 10/26/2020

(Continued on Page 2)
(Form 8400-4)

SECTION D. (Continued)

Comments from item 2.

This project is evaluated as long-term. The proposed project areas are within VRM Class III and will contain permanent aboveground infrastructures. The KOP was identified for proximity to a scenic view that the casual observer can see for long distances. This area is a thoroughfare to access recreational areas.

Long-term impacts to the view-shed at the KOP would result from the introduction of new human-made elements in the form of a oil/gas infrastructure. Portions of the proposed project areas will be reshaped and re-contoured to pre-construction conditions and reclaimed with native seed mixture; vegetation is expected to regrow within two years, reducing visual disturbance. The NAU E01 and I01 facilities and large aboveground infrastructure would be camouflaged and concealed to blend into the existing terrain and vegetation. The proposed projects would conform to VRM Class III management objectives by following the mitigation measures outlined by the BLM FFO.

Additional Mitigating Measures (See item 3)

(Form 8400-4, Page 2)

Form 8400-4
(June 2018)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 08/18/2020
District Office: BLM FFO
Field Office: Farmington
Land Use Planning Area: Oil well

SECTION A. PROJECT INFORMATION

1. Project Name DJR's BTWU G34-2308 well pad	4. KOP Location (T.R.S) Section 354 T. 23N., R. 8W.	5. Location Sketch From existing road; visible for 60 seconds @10 mph from west to east, to where the proposed access road intersects existing road.
2. Key Observation Point (KOP) Name West approach		
3. VRM Class at Project Location Class III	(Lat. Long) 36.186914°, -107.667761°	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	flat, smooth	Smooth and round	Road in foreground, electrical poles in distance.
LINE	Horizontal, undulation of ridge.	no strong lines	vertical lines from electric poles; horizontal lines from road
COLOR	gray, green	Brown, tan, dark green	tan, brown
TEX-TURE	smooth	medium shrub texture	Smooth, angular

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	flat pad surface; sloping cut and fill	removed until reclamation-smooth	tanks, wellheads, and pipelines; block
LINE	strong lines from pad	sharp lines along pad until reclaimed	vertical lines
COLOR	buff soils on pad	less veg color-light green, tan	covert green
TEX-TURE	Smooth, graded surface	more uniform, smooth	angular

SECTION D. CONTRAST RATING ___SHORT TERM ✓LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
FORM			✓				✓				✓	
LINE		✓				✓				✓		
COLOR			✓			✓					✓	
TEXTURE			✓				✓				✓	

2. Does project design meet visual resource management objectives? ✓Yes ___No (Explain on reverses side)

3. Additional mitigating measures recommended ___Yes ✓No (Explain on reverses side)

Evaluator's Names: SWCA Environmental Consultants
Date: 08/18/2020

(Continued on Page 2)

(Form 8400-4)

SECTION D. (Continued)

Comments from item 2.

This project is evaluated as long-term. The proposed project is located in VRM Class III area and will contain permanent aboveground infrastructure. Per the BLM, since there are no residential complexes within the vicinity or directly adjacent to the well pad, the KOP included a visual analysis while driving along the existing road. Long-term impacts to the view-shed would result from the introduction of new human-made elements in the form of a oil/gas well pad. Portions of the proposed project area will be reshaped and re-contoured to pre-construction conditions, and reclaimed with native seed mixture; vegetation is expected to regrow within two years, reducing visual disturbance. This proposed project would conform to the objective of VRM Class III management objectives.

Additional Mitigating Measures (See item 3)

(Form 8400-4, Page 2)

Form 8400-4
(June 2018)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 08/18/2020
District Office: BLM FFO
Field Office: Farmington
Land Use Planning Area: Oil well

SECTION A. PROJECT INFORMATION

1. Project Name DJR BTWU E35-2308 well pad	4. KOP Location (T.R.S) Section 35 T. 23N., R. 8W.	5. Location Sketch From existing road; visible for 90 seconds @15 mph from west to east, to where pipeline bends north.
2. Key Observation Point (KOP) Name West approach		
3. VRM Class at Project Location Class III	(Lat. Long) 36.189035°, -107.656880°	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	smooth, flat	Smooth and round	Road in foreground, electrical poles in distance.
LINE	Horizontal, undulation of ridge.	no strong lines	vertical lines from electric poles; horizontal lines from road
COLOR	gray, green	Brown, tan, dark green	tan, brown
TEX-TURE	smooth	medium shrub texture	Smooth, angular

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	flat pad surface; sloping cut and fill	removed until reclamation-smooth	tanks, wellheads, and pipelines; block
LINE	strong lines from pad	sharp lines along pad until reclaimed	vertical lines
COLOR	buff soils on pad	less veg color-light green, tan	covert green
TEX-TURE	Smooth, graded surface	more uniform, smooth	angular

SECTION D. CONTRAST RATING ___SHORT TERM ✓LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			✓				✓				✓	
	LINE		✓				✓				✓		
	COLOR			✓			✓					✓	
	TEXTURE			✓				✓				✓	

2. Does project design meet visual resource management objectives? ✓ Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes ✓ No (Explain on reverses side)

Evaluator's Names: SWCA Environmental Consultants
Date: 08/18/2020

(Continued on Page 2)
(Form 8400-4)

SECTION D. (Continued)

Comments from item 2.

This project is evaluated as long-term. The proposed project is located in VRM Class III area and will contain permanent aboveground oil and gas infrastructure. Per the BLM, elevation precludes impacts to the residences located at bottom of cliff. Long-term impacts to the view-shed would result from the introduction of new human-made elements in the form of a oil/gas infrastructure. Portions of the proposed project area will be reshaped and re-contoured to pre-construction conditions, and reclaimed with native seed mixture;vegetation is expected to regrow within two years, reducing visual disturbance. This proposed project would conform to the objective of VRM Class III management objectives.

Additional Mitigating Measures (See item 3)

(Form 8400-4, Page 2)

Form 8400-4
(June 2018)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: 04/28/2020
District Office: BLM FFO
Field Office: Farmington
Land Use Planning Area: Oil Well

SECTION A. PROJECT INFORMATION

1. Project Name	4. KOP Location (T.R.S)	5. Location Sketch
DJR's BTWN A35 Well Pad.	Section 35, T. 23N., R. 8W.	
2. Key Observation Point (KOP) Name KOP1-facing south from existing road towards PPA		
3. VRM Class at Project Location Class III	(Lat. Long) 36.190578°, -107.645282°	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain, rugged background and flat foreground	Clear uniformity in background and diffuse blocks from shrubs and trees in mid and foreground	Road in foreground.
LINE	Horizontal, undulation of ridge.	Flat and undulating in mid and background, jagged in foreground	Curving and flat lines from road surface.
COLOR	Light and dark brown, light, slate gray,yellow-tan, reddish-tan, light blue, snow while white	Blue-green, yellow-green, slate gray, dark gray/green	Light tan.
TEX-TURE	Coarse mid and foreground, smooth background	Coarse mid and foreground, smooth background	Smooth lines

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat forms from the the pad constuction	Short, smooth, undulating lines from temporary disturbance, construction, reclamation and contouring in foreground	Block-like forms from completion of tanks within VRM; upright forms during construction
LINE	Near horizontal from temp disturbance for the fiber cable and flat horizontal lines post construction	Straight bladed lines from fiber cable workspace edges and clear, flat lines were vegetation is removed	Ground and mid range lines.
COLOR	Some tan and gray colors expected from the ground disturbance	Areas of lighter and brighter green where reclamation would occur	Tan and gray colors expected from the disturbance and pad constiction.
TEX-TURE	Smooth where disturbance has occurred	Smooth from temporary disturbance and jagged from reclaimed vegetation growth.	Smooth

SECTION D. CONTRAST RATING ___SHORT TERM ✓LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM			✓				✓				✓	
	LINE			✓				✓				✓	
	COLOR			✓				✓				✓	
	TEXTURE			✓				✓				✓	

2. Does project design meet visual resource management objectives? ✓Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
___Yes ✓No (Explain on reverses side)

Evaluator's Names: SWCA Environmental Consultants
Date: 04/28/2020

(Continued on Page 2)

(Form 8400-4)

SECTION D. (Continued)

Comments from item 2.

This project is evaluated as long-term. The proposed project is within the VRM Class III area and will contain permanent aboveground infrastructure. The KOP was identified for proximity to the project and is located at the existing road facing south towards the pad center. Long-term impacts to the view-shed at the KOP would result from the introduction of new human-made elements in the form of a oil/gas infrastructure. Portions of the proposed project area will be reshaped and re-contoured to pre-construction conditions, and reclaimed with native seed mixture; vegetation is expected to regrow within two years, reducing visual disturbance. This proposed project would conform to the objective of VRM Class III management objectives by following mitigation measures, including painting all infrastructure in covert green to help camouflage to the native landscape.

Additional Mitigating Measures (See item 3)

(Form 8400-4, Page 2)